

NOTICE OF REVISION (NOR)		1. DATE (YYMMDD) 93-09-02	Form Approved OMB No. 0704-0188
This revision described below has been authorized for the document listed.			
Public reporting burden for this collection is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302 and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503. PLEASE DO NOT RETURN YOUR COMPLETED FORM TO EITHER OF THESE ADDRESSES. RETURN COMPLETED FORM TO THE GOVERNMENT ISSUING CONTRACTING OFFICER FOR THE CONTRACT/ PROCURING ACTIVITY NUMBER LISTED IN ITEM 2 OF THIS FORM.		2. PROCURING ACTIVITY NO.	
		3. DODAAC	
4. ORIGINATOR	b. ADDRESS (Street, City, State, Zip Code) Defense Electronics Supply Center 1507 Wilmington Pike Dayton, OH 45444-5270	5. CAGE CODE 67268	6. NOR NO. 5962-R219-93
a. TYPED NAME (First, Middle Initial, Last)		7. CAGE CODE 67268	8. DOCUMENT NO. 5962-89502
9. TITLE OF DOCUMENT MICROCIRCUIT, LINEAR, VIDEO OPERATIONAL AMPLIFIER, MONOLITHIC SILICON		10. REVISION LETTER	
		a. CURRENT A	b. NEW B
11. ECP NO. 5962-89502ECP-1			
12. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES ALL			
13. DESCRIPTION OF REVISION Sheet 1: Revisions ltr column; add "B". Revisions description column; add "Changes in accordance with NOR 5962-R219-93". Revisions date column; add "93-09-02". Revision level block; add "B". Rev status of sheets; For sheets 1 and 4, add "B". Sheet 4: TABLE I. Output current test. For + V_{OUT} test, under conditions column, delete " $V_{OUT} = +10 V$ " and substitute " $V_{OUT} = +9 V$ ". For - V_{OUT} test, under conditions column, delete " $V_{OUT} = -10 V$ " and substitute " $V_{OUT} = -9 V$ ". Revision level block; add "B".			
14. THIS SECTION FOR GOVERNMENT USE ONLY			
a. (X one)	<input checked="" type="checkbox"/>	(1) Existing document supplemented by the NOR may be used in manufacture.	
	<input type="checkbox"/>	(2) Revised document must be received before manufacturer may incorporate this change.	
	<input type="checkbox"/>	(3) Custodian of master document shall make above revision and furnish revised document.	
b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT		c. TYPED NAME (First, Middle Initial, Last) MICHAEL A. FRYE	
d. TITLE CHIEF, MICROELECTRONICS BRANCH	e. SIGNATURE MICHAEL A. FRYE		f. DATE SIGNED (YYMMDD) 93-09-02
15a. ACTIVITY ACCOMPLISHING REVISION DESC	b. REVISION COMPLETED (Signature) RICK C. OFFICER	c. DATE SIGNED (YYMMDD) 93-09-02	

NOTICE OF REVISION (NOR) (See MIL-STD-480 for instructions) This revision described below has been authorized for the document listed.		DATE (YYMMDD) 92-08-03	Form Approved OMB No. 0704-0188
Public reporting burden for this collection is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.			
1. ORIGINATOR NAME AND ADDRESS Defense Electronics Supply Center Dayton, Ohio 45444-5277		2. CAGE CODE 67268	3. NOR NO. 5962-R249-92
		4. CAGE CODE 67268	5. DOCUMENT NO. 5962-89502
6. TITLE OF DOCUMENT MICROCIRCUIT, LINEAR, VIDEO OPERATIONAL AMPLIFIER, MONOLITHIC SILICON		7. REVISION LETTER (Current)	8. ECP NO. (New) A
		8. ECP NO. No registered users listed	
9. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES			
10. DESCRIPTION OF REVISION Sheet 1: Revisions ltr column; add "A" Revisions description column; add "Changes in accordance with NOR 5962-R249-92". Revisions date column; add "92-08-03". Revision level block; add "A". Rev status of sheets; For sheets 4 and 6, add "A". Sheet 4: TABLE I, large signal voltage gain test; under conditions column for $+A_{VOL}$, delete " $V_{OUT} = 0 V$ and $+10 V$ " and substitute " $V_{OUT} = 0 V$ and $+8 V$ ". Also, under conditions column for $-A_{VOL}$, delete " $V_{OUT} = 0 V$ and $-10 V$ " and substitute " $V_{OUT} = 0 V$ and $-8 V$ ". Revision level block; add "A". Sheet 6: TABLE I, footnote number 7, delete the sentence, "Sample tested on every lot to a LTPD = 5", and substitute "Tested initially and after any design changes that affects the parameters". Revision level block; add "A".			
11. THIS SECTION FOR GOVERNMENT USE ONLY			
a. CHECK ONE <input checked="" type="checkbox"/> EXISTING DOCUMENT SUPPLEMENTED BY THIS NOR MAY BE USED IN MANUFACTURE. <input type="checkbox"/> REVISED DOCUMENT MUST BE RECEIVED BEFORE MANUFACTURER MAY INCORPORATE THIS CHANGE. <input type="checkbox"/> CUSTODIAN OF MASTER DOCUMENT SHALL MAKE ABOVE REVISION AND FURNISH REVISED DOCUMENT TO:			
b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT DESC-ECS	SIGNATURE AND TITLE MICHAEL A. FRYE BRANCH CHIEF	DATE (YYMMDD) 92-08-03	
12. ACTIVITY ACCOMPLISHING REVISION DESC-ECS	REVISION COMPLETED (Signature) RICK C. OFFICER	DATE (YYMMDD) 92-08-03	

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

REV																				
SHEET																				
REV																				
SHEET																				

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

PMIC N/A	PREPARED BY Charles E. Besore	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	MICROCIRCUIT, LINEAR, VIDEO OPERATIONAL AMPLIFIER, MONOLITHIC SILICON																	
	APPROVED BY Michael A. Frye																		
	DRAWING APPROVAL DATE 91-03-22	SIZE A	CAGE CODE 67268	5962-89502															
	REVISION LEVEL	SHEET 1 OF 9																	

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:



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	HA-2544	Video operational amplifier

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

<u>Outline letter</u>	<u>Case outline</u>
G	A-1 (8-lead, .370" x .185"), can package
P	D-4 (8-lead, .405" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings. 1/

Voltage between +V and -V terminals -----	33 V dc
Differential input voltage -----	±6.0 V dc
Voltage at either input terminal -----	+V to -V
Peak output current -----	40 mA
Storage temperature -----	-65° C to +150° C
Maximum power dissipation (P _D) 1/	
Case G -----	860 mW
Case P -----	780 mW
Case 2 -----	1.1 W
Lead temperature (soldering, 10 seconds) -----	+275° C
Thermal resistance, junction-to-case (θ _{JC}) -----	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ _{JA}):	
Case G -----	116° C/W
Case P -----	129° C/W
Case 2 -----	92° C/W
Junction temperature (T _J) -----	+175° C

1.4 Recommended operating conditions.

Positive supply voltage range (+V) -----	+12 V dc to +15 V dc
Negative supply voltage range (-V) -----	-12 V dc to -15 V dc
Common mode input voltage (V _{CM}) -----	<(+V - -V)/2
Load resistance (R _L) -----	≥ 1.0 kΩ
Ambient temperature range (T _A) -----	-55° C to +125° C

1/ Derate linearly above T_A = +75° C as follows:
 Case G = 8.6 mW/° C
 Case P = 7.8 mW/° C
 Case 2 = 11 mW/° C

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

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and apply over the full 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-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).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C ≤ T _A ≤ +125°C 1/ +V = +15 V, -V = -15 V, C _L ≤ 10 pF Unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Input offset voltage	V _{IO}	V _{CM} = 0 V	1		±15	mV
			2, 3		±20	
Input bias current	+I _B	V _{CM} = 0 V, +R _S = 1.0 kΩ, -R _S = 10 Ω	1		±15	μA
			2, 3		±20	
	-I _B	V _{CM} = 0 V, +R _S = 10 Ω, -R _S = 1.0 kΩ	1		±15	μA
			2, 3		±20	
Input offset current	I _{IO}	V _{CM} = 0 V, +R _S = 1.0 kΩ, -R _S = 1.0 kΩ	1		±2.0	μA
			2, 3		±3.0	
Common mode voltage range	+V _{CM}	+V = +5.0 V, -V = -25 V	1, 2, 3	10		V
	-V _{CM}	+V = +25 V, -V = -5.0 V	1, 2, 3	-10		V
Large signal voltage gain	+A _{VOL}	V _{OUT} = 0 V and +10 V, R _L = 1 kΩ	4	3.5		kV/V
			5, 6	2.5		
	-A _{VOL}	V _{OUT} = 0 V and -10 V, R _L = 1 kΩ	4	3.5		kV/V
			5, 6	2.5		
Common mode rejection ratio	+C _{MRR}	ΔV _{CM} = +10 V, +V = +5.0 V, -V = -25 V, V _{OUT} = -10 V	1, 2, 3	75		dB
	-C _{MRR}	ΔV _{CM} = -10 V, +V = +25 V, -V = -5.0 V, V _{OUT} = +10 V	1, 2, 3	75		dB
Output current	+I _{OUT}	V _{OUT} = +10 V T _A = +25°C	4	25		mA
	-I _{OUT}	V _{OUT} = -10 V T _A = +25°C	4	-25		mA
Output voltage swing	+V _{OUT}	R _L = 1 kΩ	4, 5, 6	+10.0		
	-V _{OUT}	R _L = 1 kΩ	4, 5, 6	-10.0		

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 1/ +V = +15 V, -V = -15 V, C _L ≤ 10 pF Unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Quiescent power supply current	+I _{CC}	V _{OUT} = 0 V, I _{OUT} = 0 mA	1, 2, 3		12	mA
	-I _{CC}	V _{OUT} = 0 V, I _{OUT} = 0 mA	1, 2, 3		-12	mA
Power supply rejection ratio	+PSRR	+V = +10 V and +20 V, -V = -15 V	1, 2, 3	70		dB
	-PSRR	-V = -10 V and -20 V, +V = +15 V	1, 2, 3	70		dB
Offset voltage adjustment	+V _{IO} (ADJ)	T _A = +25°C 2/	1	V _{IO} -1.0		mV
	-V _{IO} (ADJ)	T _A = +25°C 2/	1	V _{IO} +1.0		mV
Slew rate	+SR	V _{OUT} = -3.0 V to +3.0 R _S = 100Ω, R _L = 1 kΩ, A _V = 1 V/V	7	100		V/μs
			8	70		
	-SR	V _{OUT} = +3.0 V to -3.0 R _S = 100Ω, R _L = 1 kΩ, A _V = 1 V/V	7	100		V/μs
			8	70		
Differential gain 3/	dA _V	R _S = 50Ω, R _L = 1.0 kΩ f _o = 3.58 Mhz and 4.43 Mhz T _A = +25°C	4		.04	dB
Differential phase 3/	d∅		4		.11	degrees
Unity gain bandwidth	UGBW	V _{OUT} = 200 mV, f at -3.0 dB, T _A = +25°C	4	45		MHz
Gain tolerance 3/	ΔA _V	f _o = 5.0 Mhz, T _A = +25°C	4		±.15	dB
		f _o = 10 Mhz, T _A = +25°C	4		±.35	dB
Full power bandwidth 4/	FPBW	V _{PK} = 1.0 V, R _L = 1 kΩ, T _A = +25°C	4	15.9		MHz
		V _{PK} = 5.0 V, R _L = 1 kΩ, T _A = +25°C	4	3.2		MHz

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 1/ +V = +15 V, -V = -15 V, C _L ≤ 10 pF Unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Closed loop stable gain 3/	CLSG	R _L = 1.0 kΩ, C _L ≤ 1.0 pF	4, 5, 6	+1.0		V/V
Rise time 5/	t _r	V _{OUT} = 0 V to +200 mV	9		15	ns
			10, 11 3/		15	
Fall time 5/	t _f	V _{OUT} = 0 V to -200 mV	9		15	ns
			10, 11 3/		15	
Overshoot	+OS	V _{OUT} = 0 V to +200 mV	9		20	%
			10, 11 3/		30	
	-OS	V _{OUT} = 0 V to -200 mV	9		20	%
			10, 11 3/		30	
Output resistance 3/	R _{OUT}	T _A = +25°C	4		40	Ω
Quiescent power consumption 6/	P _C	V _{OUT} = 0 V, I _{OUT} = 0 mA	1, 2, 3		360	mW

1/ For DC tests (subgroups 1, 2, and 3): R_S = 10Ω, R_L = 500 kΩ, V_{OUT} = 0 V unless otherwise specified. For AC tests (subgroups 4, 5, 6, 7, 8, 9, 10, 11): A_V = +1.0 V/V, R_L = 1 kΩ, unless otherwise specified.

2/ Offset adjustment range is V_{IO} (measured) ±1.0 mV minimum referred to output. This test is for functionality only to assure adjustment through 0V.

3/ If not tested, shall be guaranteed to the limits specified in table I.

4/ Full power bandwidth = $\frac{SR}{2 \sqrt{V_{PK}}}$.

5/ Rise and fall times measured between 10 percent and 90 percent point.

6/ Quiescent power consumption based on quiescent supply current test maximum (no load on outputs).

7/ Sample tested on every lot to a LTPD = 5.

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Device type	01	
Case outline	G and P	2
Terminal number	Terminal symbol	
1	Balance	No connection
2	-IN	Balance
3	+IN	No connection
4	-V	No connection
5	Balance	-IN
6	Output	No connection
7	+V	+IN
8	No connection	No connection
9	---	No connection
10	---	-V
11	---	No connection
12	---	Balance
13	---	No connection
14	---	No connection
15	---	Output
16	---	No connection
17	---	+V
18	---	No connection
19	---	No connection
20	---	No connection

FIGURE 1. Terminal connections.

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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-ECS prior to listing as an approved source of supply shall state 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-ECS 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 3.5 herein).
 - (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. Tests shall be as specified in table II herein.

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) $T_A = +125^\circ\text{C}$, 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 (per method 5005, table I)
Interim electrical parameters (method 5004)	- - -
Final electrical test parameters (method 5004)	1*, 2, 3, 4, 5, 6, 7
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6, 7, 8**, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

** Subgroups 8, 10, and 11 guaranteed if not tested.

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).

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-ECS, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

6.6 Approved sources of supply. Approved sources of supply are 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-ECS.

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STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 91-03-22

Approved sources of supply for SMD 5962-89502 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-ECS. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN ^{1/}
5962-8950201GX	34371	HA2-2544/883
5962-8950201PX	34371	HA7-2544/883
5962-89502012X	34371	HA4-2544/883

^{1/} 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

34371

Vendor name
and address

Harris Semiconductor
P. O. Box 883
Melbourne, FL 32901

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