

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Made technical changes to table I. Editorial changes throughout.	91-08-06	W. Heckman

REV																				
SHEET																				
REV																				
SHEET																				

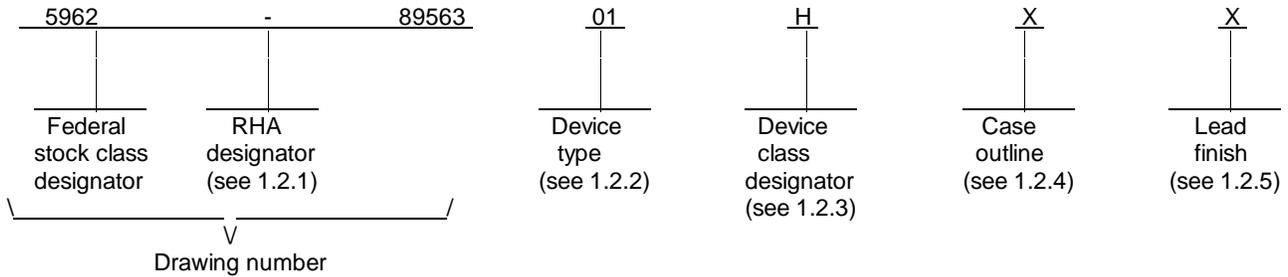
REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12						

PMIC N/A <p style="text-align: center;">STANDARDIZED MILITARY DRAWING</p> <p style="text-align: center;">THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE</p> <p style="text-align: center;">AMSC N/A</p>	PREPARED BY Steve Duncan CHECKED BY Robert M. Heber APPROVED BY William K. Heckman DRAWING APPROVAL DATE 29 JUNE 1990 REVISION LEVEL <p style="text-align: center;">A</p>	<p style="text-align: center;">DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444</p> <p style="text-align: center;">MICROCIRCUIT, LINEAR, 16-BIT, A/D CONVERTER, HYBRID</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">SIZE A</td> <td style="width: 20%;">CAGE CODE 67268</td> <td style="width: 65%; text-align: center;">5962-89563</td> </tr> </table> <p style="text-align: center;">SHEET 1 OF 12</p>	SIZE A	CAGE CODE 67268	5962-89563
SIZE A	CAGE CODE 67268	5962-89563			

1. SCOPE

1.1 Scope. This drawing forms a part of a one part - one part number documentation system (see 6.6 herein). This drawing describes device requirements for hybrid microcircuits to be processed in accordance with MIL-H-38534. Two product assurance classes, military high reliability (device class H) and space application (device class K) and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:



1.2.1 Radiation hardness assurance (RHA) designator. Device classes H and K RHA marked devices shall meet the MIL-H-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 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>	<u>Short cycle 1/</u>
01	MN5290	A/D converter, 16-bit resolution	14-bit
02	MN5291	A/D converter, 16-bit resolution	13-bit

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level as follows:

<u>Device class</u>	<u>Device requirements documentation</u>
H or K	Certification and qualification to MIL-H-38534

1.2.4 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
X	See figure 1 (32-lead, .810" x 1.730" x .172"), hybrid package

1/ For applications requiring fewer than 16 bits of resolution, the device types 01 and 02 can be truncated or short cycled at the desired number of bits with a proportionate decrease in conversion time. To truncate at n bits, simply connect the n + 1 bit output to the Short Cycle pin (terminal number 32). For example, to truncate at 14 bits, connect terminal number 5 (bit 15) to terminal number 32; converting will stop and Status (terminal number 1) will go low after bit 14 has been set.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 2

1.2.5 Lead finish. The lead finish shall be as specified in MIL-H-38534 for classes H and K. 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. 2/

Positive supply voltage (V_{CC}) -----	-0.5 V dc to +18 V dc
Negative supply voltage (V_{EE}) -----	+0.5 V dc to -18 V dc
Logic supply voltage (V_{DD}) -----	0 V dc to +7 V dc
Analog input channels -----	± 22 V dc
Digital input -----	0 V dc to +5.5 V dc
Power dissipation (P_D) -----	1.08 W
Thermal resistance (Θ_{JC}) -----	5° C/W
Thermal resistance (Θ_{JA}) -----	28° C/W
Lead temperature (soldering, 10 seconds) --	+300° C
Storage temperature range -----	-65° C to +150° C
Junction temperature (T_J) -----	+175° C

1.4 Recommended operating conditions.

Positive supply voltage range (V_{CC}) -----	+14.55 V dc to +15.45 V dc
Negative supply voltage range (V_{EE}) -----	-14.55 V dc to -15.45 V dc
Logic supply voltage range (V_{DD}) -----	+4.75 V dc to +5.25 V dc
Ambient operating temperature range (T_A) ----	-55° C to +125° C

2. APPLICABLE DOCUMENTS

2.1 Government specifications, standards, and handbook. Unless otherwise specified, the following specifications, standards, and handbook 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.

SPECIFICATIONS

MILITARY

- MIL-M-38510 - Microcircuits, General Specification for.
- MIL-H-38534 - Hybrid Microcircuits, General Specification for.

2/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 3

STANDARDS

MILITARY

- MIL-STD-480 - Configuration Control-Engineering Changes, Deviations and Waivers.
- MIL-STD-883 - Test Methods and Procedures for Microelectronics.

HANDBOOK

MILITARY

- MIL-HDBK-780 - Standardized Military Drawings.

(Copies of the specifications, standards, and handbook 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 MIL-H-38534 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections 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 specified 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-H-38534. 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 QML-38534.

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall submit for DESC-ECC review and approval electrical test data (variables format) on 22 devices from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary of all parameters manually tested, and for those which, if any, are guaranteed.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance submitted to DESC-ECC shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-38534 shall be provided with each lot of microcircuits delivered to this drawing.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 4

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Analog						
Input voltage range	V _I	Unipolar	1, 2, 3	0	+5	V
				0	+10	
		Bipolar		0	+20	
				-2.5	+2.5	
				-5	+5	
				-10	+10	
Digital						
Input voltage high	V _{IH}	For all digital inputs	1, 2, 3	+2.0		V
Input voltage low	V _{IL}	For all digital inputs	1, 2, 3		+0.8	
Input current high	I _{IH}	For all digital inputs V _{IH} = +2.4 V	1, 2, 3		+40	μA
Input current low	I _{IL}	For all digital inputs V _{IL} = +0.4 V	1, 2, 3		-1.6	mA
Output voltage high	V _{OH}	I _{OH} = -320 μA	1, 2, 3	+2.4		V
Output voltage low	V _{OL}	I _{OL} = +3.2 mA	1, 2, 3		+0.4	
Power supply						
Supply current	I _{CC}	V _{CC} = +15 V	1, 2, 3		+37	mA
	I _{EE}	V _{EE} = -15 V	1, 2, 3		-29	
	I _{DD}	V _{DD} = +5 V	1, 2, 3		+18	
Power consumption	P _D		1, 2, 3		1080	mW

See footnotes at end of table.

**STANDARDIZED
MILITARY DRAWING**
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

SIZE
A

5962-89563

REVISION LEVEL
A

SHEET

5

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions ^{1/} -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Power supply						
Power supply rejection ratio	PSRR	+14.5 V ≤ +V _{CC} ≤ +15.5 V	1, 2, 3	-0.02	+0.02	%FS/ %Vs
		-15.5 V ≤ -V _{EE} ≤ -14.5 V	1, 2, 3	-0.02	+0.02	
		+4.75 V ≤ V _{DD} ≤ +5.25 V	1, 2, 3	-0.01	+0.01	
^{2/} Accuracy						
Unipolar 10 V	V _{+FS}	MSB LSB 1111 1111 1111 1* <u>Nominal</u> (+9.9991)	4	+9.9841	10.0141	V
			5, 6	+9.9691	10.0291	
Bipolar 10 V	V _{+FS}	MSB LSB 1111 1111 1111 1* <u>Nominal</u> (+4.9991)	4	+4.9791	+5.0191	
			5, 6	+4.9591	+5.0391	
Bipolar 20 V	V _{+FS}	MSB LSB 1111 1111 1111 1* <u>Nominal</u> (+9.9982)	4	+9.9582	10.0382	
			5, 6	+9.9182	10.0782	
Unipolar 10 V offset	V _{UO}	MSB LSB 0000 0000 0000 0* <u>Nominal</u> +0.0003	4	-0.0097	+0.0103	V
			5, 6	-0.0147	+0.0153	
Bipolar 10 V zero	V _{BZ1}	MSB LSB **** * * * <u>Nominal</u> -0.0003	4	-0.0123	+0.0117	V
			5, 6	-0.0203	+0.0197	
Bipolar 20 V zero	V _{BZ2}	MSB LSB **** * * * <u>Nominal</u> -0.0006	4	-0.0246	+0.0234	
			5, 6	-0.0406	+0.0394	
Bipolar zero drift	$\frac{\Delta V_{BZ}}{\Delta T}$		5, 6	-15	+15	ppmFSR °C
Unipolar offset drift	$\frac{\Delta UO}{\Delta T}$		5, 6	-15	+15	ppmFSR °C

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 6

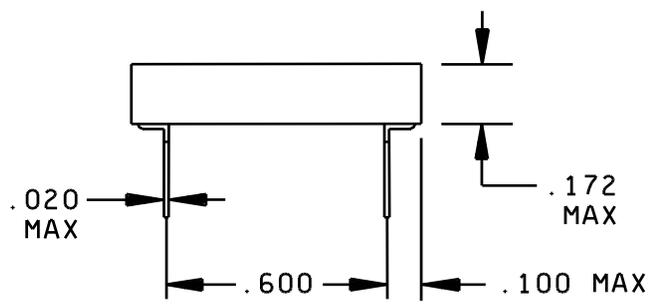
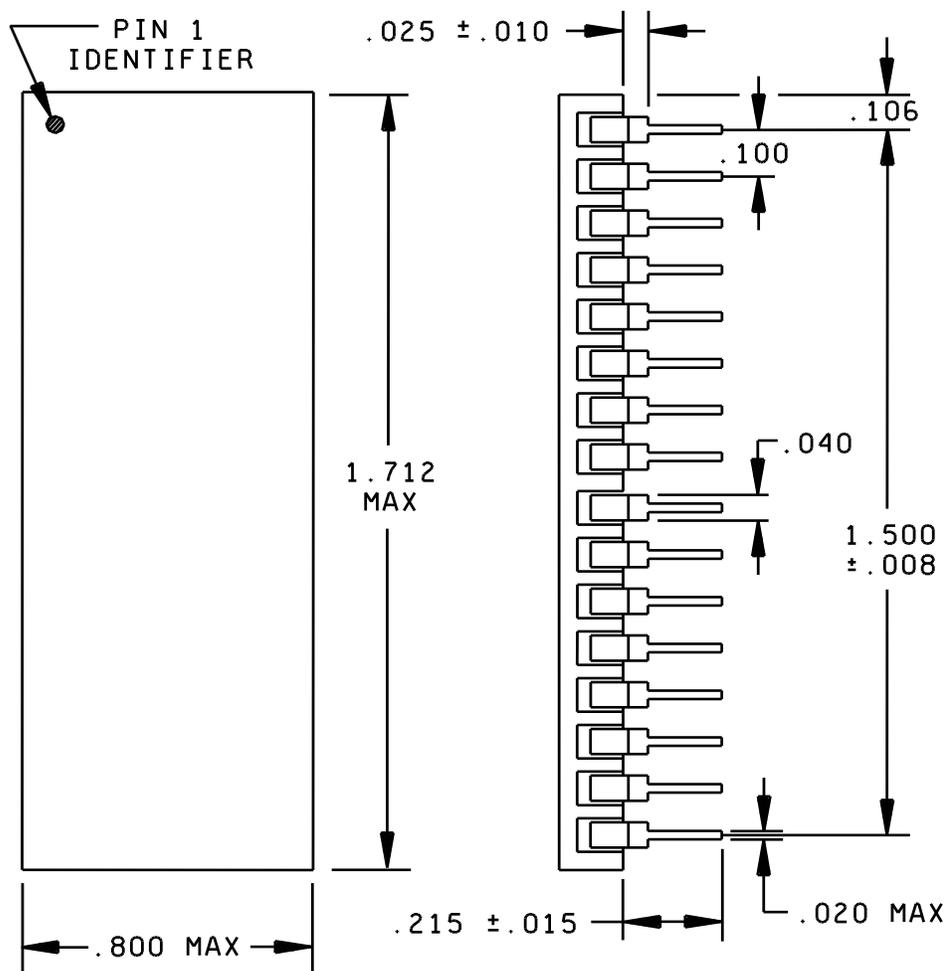
TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Accuracy						
Gain error	A _e		4	-0.1	+0.1	%
			5, 6	-0.2	+0.2	
Gain drift	$\frac{\Delta A_e}{\Delta T}$		4, 5, 6	-15	+15	ppm °C
Integral linearity error	LE	14-bit linearity	4	-0.5	+0.5	LSB
			5, 6	-1.0	+1.0	
Differential linearity error	DLE	14-bit linearity	4	-0.9	+1.0	LSB
			5, 6	-0.9	+2.0	
Minimum resolution for no missing codes			Device type 01	4, 5, 6	14	Bits
			Device type 02		13	
Reference voltage	V _{REF}		4	+9.990	+10.010	V
Conversion time	t _c		9, 10, 11		40	μs

1/ V_{CC} = +15 V, V_{EE} = -15 V, V_{DD} = +5.0 V, unless otherwise specified.

2/ * The output will transition from a "1" to "0" or vice versa as the analog input passes through the voltages listed in limit columns.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 7



Inches	mm
.005	0.13
.008	0.20
.010	0.25
.012	0.30
.015	0.38
.020	0.51
.025	0.64
.100	2.54
.106	2.69
.172	4.37
.215	5.46
.600	15.24
.800	20.32
1.500	38.10
1.712	43.48

NOTES:

1. Dimensions are in inches.
2. Metric dimensions are given for general information only.
3. Unless otherwise specified, all dimensions $\pm .005$ inch (0.13 mm).

FIGURE 1. Case outline.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 8

Device types	01 and 02
Case outline	X
Terminal number	Terminal symbol
1	STATUS (E.O.C.)
2	CLOCK OUTPUT
3	BIT 13
4	BIT 14
5	BIT 15
6	BIT 16 (LSB)
7	BIPOLAR OFFSET
8	10 V INPUT RANGE
9	20 V INPUT RANGE
10	SERIAL OUTPUT
11	BIT 12
12	BIT 11
13	BIT 10
14	BIT 9
15	BIT 8
16	BIT 7
17	BIT 6
18	BIT 5
19	BIT 4
20	BIT 3
21	BIT 2
22	BIT 1 (MSB)
23	V _{EE}
24	REFERENCE OUTPUT
25	GAIN ADJUST
26	GROUND
27	V _{CC}
28	SUMMING JUNCTION
29	V _{DD}
30	START CONVERT
31	GROUND
32	SHORT CYCLE

FIGURE 2. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 9

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5008, group A test table)
Interim electrical parameters	---
Final electrical test parameters	1*,2, 3, 4, 5, 6, 9, 10, 11
Group A test requirements	1, 2, 3, 4, 5, 6, 9, 10, 11
Group C end-point electrical parameters	1, 2, 3
Group E end-point electrical parameters for RHA devices	Subgroups** (per method 5005, group A test table)

* PDA applies to subgroup 1.

** When applicable to this Standardized Military Drawing,
the subgroups shall be defined.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534.

4.2 Screening. Screening shall be in accordance with MIL-H-38534. 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 3.7 herein).

(2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.

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 MIL-H-38534 and as specified herein.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 10

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7 and 8 in table X, method 5008 of MIL-STD-883 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspection. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

- 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 3.7 herein).
 - (2) T_A as specified in accordance with table I of method 1005 of MIL-STD-883.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

4.3.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels for device classes H and K shall be M, D, R, and H. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

- a. RHA tests for device classes H and K for levels M, D, R, and H shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.
- b. End-point electrical parameters shall be as specified in table II herein.
- c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table II herein.
- d. For device classes H and K, the devices shall be subjected to radiation hardness assured tests as specified in MIL-H-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at $T_A = +25^\circ\text{C} \pm 5$ percent, after exposure.
- e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.
- f. For device classes H and K, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.
- g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-H-38534.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 11

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-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 microelectronic devices (FSC 5962) should contact DESC-ECC, telephone (513) 296-8527.

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

6.6 One part - one part number system. The one part - one part number system described below has been developed to allow for transitions between identical generic devices covered by the four major microcircuit requirements documents (MIL-M-38510, MIL-H-38534, MIL-I-38535, and 1.2.1 of MIL-STD-883) without the necessity for the generation of unique PIN's. The four military requirements documents represent different class levels, and previously when a device manufacturer upgraded military product from one class level to another, the benefits of the upgraded product were unavailable to the Original Equipment Manufacturer (OEM), that was contractually locked into the original unique PIN. By establishing a one part number system covering all four documents, the OEM can acquire to the highest class level available for a given generic device to meet system needs without modifying the original contract parts selection criteria.

<u>Military documentation format</u>	<u>Example PIN under new system</u>	<u>Manufacturing source listing</u>	<u>Document listing</u>
New MIL-M-38510 Military Detail Specifications (in the SMD format)	5962-XXXXXZZ(B or S)YY	QPL-38510 (Part 1 or 2)	MIL-BUL-103
New MIL-H-38534 Standardized Military Drawings	5962-XXXXXZZ(H or K)YY	QML-38534	MIL-BUL-103
New MIL-I-38535 Standardized Military Drawings	5962-XXXXXZZ(Q or V)YY	QML-38535	MIL-BUL-103
New 1.2.1 of MIL-STD-883 Standardized Military Drawings	5962-XXXXXZZ(M)YY	MIL-BUL-103	MIL-BUL-103

6.7 Sources of supply for device classes H and K. Sources of supply for device classes H and K are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DESC-ECC and have agreed to this drawing.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-89563
		REVISION LEVEL A	SHEET 12