

REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
G	Add two packages, F-5 and C-2. Change to military drawing format. Made changes to 1.3, table I, 6.4, figure 1, and editorial changes throughout. Add one vendor, CAGE 34371.	89-09-13	M. Frye
H	Add new device type 02. Editorial changes throughout. Add vendor CAGE 1ES66. Change PDA from 10 percent to 5 percent. Make changes to 1.3 and table I. Remove vendor CAGE 32293.	92-11-13	M. Frye

Device 01EX inactive for  
new design as of 20 July 1983.  
Use M38510/12302BEX.

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

[illegible]

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SEP 87  
5962-E351  
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

5962-E351

## 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:

77053	01	E	X
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	DG201A	Quad SPST analog switch
02	HI-201	Quad SPST analog switch, with dielectric isolation

1.2.2 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835, and as follows:

Outline letter	Descriptive designator	Terminals	Package style
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line package
F	GDFP2-F16 or CDFP3-F16	16	Flat package
2	CQCC1-N20	20	Square leadless chip carrier package

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.

Supply voltage (between V+ and V-):

Device type 01	44 V dc
Device type 02	40 V dc

Digital input voltage ( $V_{IN}$ ):

Device type 01	V- -0.3 V dc to V+
Device type 02	V- -4 V dc to V+ +4 V dc

Analog input voltage ( $V_S$ ) . . . . . V- -2 V dc to V+ +2 V dc

Current (any terminal except S or D):

Device type 01	30 mA dc
Device type 02	25 mA dc

Continuous current, S or D:

Device type 01	20 mA dc
Device type 02	25 mA dc

Peak current, S or D

(pulsed at 1 ms, 10 percent duty cycle maximum):

Device type 01	70 mA dc
Device type 02	40 mA dc

Storage temperature range . . . . . -65°C to +150°C

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Power dissipation ( $P_D$ ) . . . . . 750 mW <sup>1/</sup>  
 Lead temperature (soldering, 10 seconds) . . . . . +275°C  
 Thermal resistance, junction-to-case ( $\Theta_{JC}$ ) . . . . . See MIL-STD-1835  
 Junction temperature ( $T_J$ ):  
   Device type 01 . . . . . +150°C  
   Device type 02 . . . . . +175°C  
 V+ to ground:  
   Device type 01 . . . . . +25 V  
   Device type 02 . . . . . +20 V  
 V- to ground:  
   Device type 01 . . . . . -25 V  
   Device type 02 . . . . . -20 V

#### 1.4 Recommended operating conditions.

Positive supply voltage (V+) . . . . . +15 V dc  
 Negative supply voltage (V-) . . . . . -15 V dc  
 Minimum digital high level input voltage ( $V_{IH}$ ) . . . . . +2.4 V dc  
 Maximum digital low level input voltage ( $V_{IL}$ ) . . . . . +0.8 V dc  
 Ambient operating temperature range ( $T_A$ ) . . . . . -55°C to +125°C

## 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.

<sup>1/</sup> For case E, derate at 12 mW/°C above  $T_A = +75^\circ\text{C}$ .  
 For case F, derate at 10 mW/°C above  $T_A = +75^\circ\text{C}$ .  
 For case 2, derate at 10 mW/°C above  $T_A = +75^\circ\text{C}$ .

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### 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 outline(s). The case outline(s) 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 shall 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 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).

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Device type	Group A subgroups	<sup>2/</sup> Limits		Unit
					Min	Max	
Analog signal range	V <sub>S</sub>	<sup>3/</sup>	All	1, 2, 3		±15	V
Drain-source ON resistance	R <sub>DS(ON)</sub>	V <sub>D</sub> = ±10 V, V <sub>IN</sub> = 0.8 V, I <sub>D</sub> = ±1 mA	01	1, 3		175	Ω
				2		250	
		V <sub>S</sub> = ±10 V, V <sub>IN</sub> = 0.8 V, I <sub>D</sub> = ±1 mA All unused channels V <sub>A</sub> = 2.4 V	02	1		70	Ω
				2, 3		100	
Off input leakage current	I <sub>S(OFF)</sub>	V <sub>IN</sub> = 2.4 V, V <sub>S</sub> = ±14 V, V <sub>D</sub> = ±14 V	All	1		±2	nA
				2, 3		±100	
Off output leakage current	I <sub>D(OFF)</sub>	V <sub>IN</sub> = 2.4 V, V <sub>S</sub> = ±14 V, V <sub>D</sub> = ±14 V	01	1		±1	nA
			02			±2	
			All	2, 3		±100	nA
On leakage current	I <sub>D(ON)</sub>	V <sub>IN</sub> = 0.8 V, V <sub>D</sub> = V <sub>S</sub> = ±14 V	01	1		±1	nA
			02			±2	
			All	2, 3		±200	nA
Low level input voltage	V <sub>IL</sub>		All	1, 2, 3		0.8	V
High level input voltage	V <sub>IH</sub>		All	1, 2, 3	2.4		V

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Device type	Group A subgroups	Limits <sup>2/</sup>		Unit
					Min	Max	
Low level input leakage current	I <sub>IL</sub>	V <sub>IN</sub> = 0 V	01	1		±1	μA
				2		±10	
		V <sub>IN</sub> = 0.8 V	02	1		±0.5	μA
				2, 3		±1.0	
High level input leakage current	I <sub>IH</sub>	V <sub>IN</sub> = 2.4 V, 15 V	01	1		±1	μA
				2		±10	
			02	1		±0.5	μA
				2, 3		±1.0	
Switch ON time	t <sub>on</sub>	R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 35 pF V <sub>IH</sub> = +3 V, V <sub>IL</sub> = 0 V	01	9, 10, 11		1000	ns
		R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 100 pF V <sub>IH</sub> = +4 V, V <sub>IL</sub> = 0 V	02	9		600	
				10, 11		800	
Switch OFF time	t <sub>off</sub>	R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 35 pF V <sub>IH</sub> = +3 V, V <sub>IL</sub> = 0 V	01	9		500	ns
				10, 11		650	
		R <sub>L</sub> = 1 kΩ, C <sub>L</sub> = 100 pF V <sub>IH</sub> = +4 V, V <sub>IL</sub> = 0 V	02	9		500	
				10, 11		650	
Positive supply current	I <sub>+</sub>	V <sub>IN</sub> = 0 V	01	1, 2		4	mA
				3		6.5	
				1, 2		3	
				3		4.5	
		V <sub>IN</sub> = 0.8 V	02	1, 2		1.5	mA
				3		2.0	
				1, 2		1.5	
				3		2.0	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <sup>1/</sup> -55°C ≤ T <sub>A</sub> ≤ +125°C unless otherwise specified	Device type	Group A subgroups	<sup>2/</sup> Limits		Unit
					Min	Max	
Negative supply current	I-	V <sub>IN</sub> = 0 V	01	1, 2		-4	mA
				3		-6.5	
		V <sub>IN</sub> = 5 V		1, 2		-3	
				3		-4.5	
		V <sub>IN</sub> = 0.8 V	02	1, 2		-1.5	mA
				3		-2.0	
		V <sub>IN</sub> = 2.4 V		1, 2		-1.5	
				3		-2.0	

1/ Unless otherwise specified,  $V_+ = +15 \text{ V}$  dc and  $V_- = -15 \text{ V}$  dc.

2/ 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.

3/ Guaranteed, if not tested, to the limits specified.

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Device type	01		02	
Case outlines	E and F	2	E	2
Terminal number	Terminal symbols			
1	IN <sub>1</sub>	NC	IN <sub>1</sub>	NC
2	D <sub>1</sub>	IN <sub>1</sub>	D <sub>1</sub>	IN <sub>1</sub>
3	S <sub>1</sub>	D <sub>1</sub>	S <sub>1</sub>	D <sub>1</sub>
4	V-	S <sub>1</sub>	V-	S <sub>1</sub>
5	GND	V-	GND	V-
6	S <sub>4</sub>	NC	S <sub>4</sub>	NC
7	D <sub>4</sub>	GND	D <sub>4</sub>	GND
8	IN <sub>4</sub>	S <sub>4</sub>	IN <sub>4</sub>	S <sub>4</sub>
9	IN <sub>3</sub>	D <sub>4</sub>	IN <sub>3</sub>	D <sub>4</sub>
10	D <sub>3</sub>	IN <sub>4</sub>	D <sub>3</sub>	IN <sub>4</sub>
11	S <sub>3</sub>	NC	S <sub>3</sub>	NC
12	NC	IN <sub>3</sub>	V <sub>REF</sub> 1/	IN <sub>3</sub>
13	V+	D <sub>3</sub>	V+	D <sub>3</sub>
14	S <sub>2</sub>	S <sub>3</sub>	S <sub>2</sub>	S <sub>3</sub>
15	D <sub>2</sub>	NC	D <sub>2</sub>	V <sub>REF</sub> 1/
16	IN <sub>2</sub>	NC	IN <sub>2</sub>	NC
17	---	V+	---	V+
18	---	S <sub>2</sub>	---	S <sub>2</sub>
19	---	D <sub>2</sub>	---	D <sub>2</sub>
20	---	IN <sub>2</sub>	---	IN <sub>2</sub>

1/ V<sub>REF</sub> is normally floating, but voltage up to 10 V can be applied to raise the threshold voltage.

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-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, D, or E. The test circuit shall be maintained by the manufacturer under document revision 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 4, 5, 6, 7, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

TABLE II. Electrical test requirements.

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

\* PDA applies to subgroup 1.

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#### 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, D, or E. The test circuit shall be maintained by the manufacturer under document revision 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.

#### 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. Replaceability is determined as follows:

- a. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.
- b. When a QPL source is established, the device specified in this drawing will be replaced by the microcircuit identified as PIN M38510/12302BEX.

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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