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REV STATUS OF SHEETS	REV												
	SHEET	1	2	3	4	5	6	7	8	9	10	11	
PMIC N/A	PREPARED BY <i>Rick Offin</i>		DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444										
STANDARDIZED MILITARY DRAWING	CHECKED BY <i>Wm Johnson</i>												
	APPROVED BY <i>[Signature]</i>												
	DRAWING APPROVAL DATE 18 MAY 1989												
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	REVISION LEVEL		SIZE A	CAGE CODE 67268	5962-88778								
AMSC N/A			SHEET 1 OF 11										

DESC FORM 193
SEP 87

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

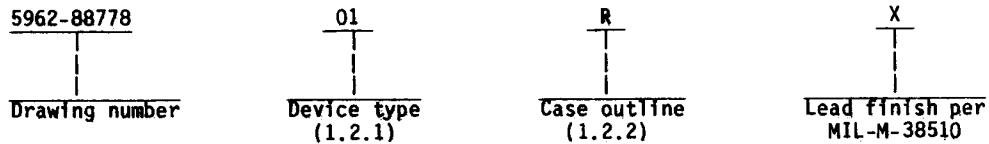
5962-E1125

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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 types shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	(See 6.4)	CMOS 12-bit buffered multiplying DAC
02	(See 6.4)	CMOS 12-bit buffered multiplying DAC

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
R	D-8 (20-lead, 1.060" 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.

V _{DD} to DGND	-0.3 V dc to +17 V dc
Supply voltage range	+5 V dc to +15 V dc
V _{REF} to GND	-0.3 V dc to +17 V dc
Digital input voltage to DGND	-0.3 V dc to V _{DD}
V _{RFB} , V _{REF} to DGND	±25 V dc
V _{OUT} to DGND	-0.3 V dc to V _{DD}
AGND to DGND	-0.3 V dc to V _{DD}
Power dissipation (P _D)	
Up to +75°C	450 mW
Derates above +75°C	6 mW/°C
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ _{JC})	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ _{JA}):	
Case R	120°C/W
Case 2	110°C/W
Junction temperature (T _J)	+150°C

1.4 Recommended operating conditions.

Operating ambient temperature range (T _A)	-55°C to +125°C
Reference voltage (V _{REF})	+10 V dc
Supply voltage	+15 V dc

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-88778
	REVISION LEVEL	SHEET 2

2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, 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.

(Copies of the specification and standard 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 and mode selection. The terminal connections and mode selection shall be as specified on figure 1.

3.2.2 Functional diagram and timing diagram. The functional diagram and write cycle timing diagram shall be as specified on figure 2.

3.2.3 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 ambient operating temperature range.

3.4 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 6.4 herein.

3.5 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 6.4. 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.

3.6 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 3

DESC FORM 193A
SEP 87

★ U. S. GOVERNMENT PRINTING OFFICE: 1988-549-904

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified <u>1/</u>	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Resolution	RES		A11	1, 2, 3	12		Bits
Relative accuracy	RA		A11	1, 2, 3		±.5	LSB
Output leakage current <u>2/</u>	I _{OUT}	DB0 to DB11 = 0 V, WR, CS = 0 V	A11	1		±10	nA
				2, 3		±200	
Differential nonlinearity	DNL	12-bit monotonic	A11	1, 2, 3		±1	LSB
Power supply rejection	PSRR	Δ V _{DD} = ±5%	A11	1		±.002	%/%
				2, 3		±.004	
Gain error <u>3/</u>	G _{FSE}	Dac register loaded with 1111 1111 1111	01	1		±1	LSB
				2, 3		±2	
			02	1		±3	
				2, 3		±4	
Referenced input resistance, V _{REF} to ground	R _{IN}		A11	1, 2, 3	7	25	kΩ
Digital input high voltage	V _{IH}		A11	1, 2, 3	2.4		V
Digital input low voltage	V _{IL}		A11	1, 2, 3		0.8	

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 4

DESC FORM 193A
SEP 87

* U. S. GOVERNMENT PRINTING OFFICE: 1988-549-904

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified <u>1/</u>	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Digital input leakage current	I _{IN}		A11	1		±1	μA
				2, 3		±10	
Gain temp. coefficient	TCAE	<u>4/</u>	A11	1, 2, 3		±5	ppm/°C
Feedthrough error	F _T	V _{REF} = ±10 V, 10 kHz sinewave <u>4/ 5/</u>	A11	4, 5, 6		10	mV p-p
Supply current from V _{DD}	I _{DD}	All digital inputs = 0 or V _{DD}	A11	1, 2, 3		100	μA
		All digital inputs = V _{IL} or V _{IH}	A11	1, 2, 3		+2	mA
Digital input capacitance	C _{IN}	T _A = +25°C V _{IN} = 0 V <u>6/</u> DB0 to DB11, WR, CS	A11	4		8	pF
Output capacitance	C _{OUT1}	DB0 to DB11 = 0 V, WR, CS = 0 V T _A = +25°C <u>6/</u>	A11	4		25	pF
Output capacitance	C _{OUT2}	DB0 to DB11 = V _{DD} , WR, CS = 0 V T _A = +25°C <u>6/</u>	A11	4		50	pF

See footnotes at end of table.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 5

DESC FORM 193A
SEP 87

* U. S. GOVERNMENT PRINTING OFFICE: 1988-549-904

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified 1/	Device types	Group A subgroups	Limits		Unit
					Min	Max	
Chip select to write setup time	t _{CS}	7/ 8/	A11	9	150		ns
				10, 11	210		
Chip select to write hold time	t _{CH}	7/ 8/	A11	9, 10, 11	0		
Write pulse width	t _{WR}	t _{CS} = t _{WR} , t _{CH} = 0 7/ 8/	A11	9	150		
				10, 11	210		
Data setup time	t _{DS}	7/ 8/	A11	9	225		
				10, 11	300		
Data hold time	t _{DH}	7/ 8/	A11	9, 10, 11	10		

- 1/ V_{REF} = +10 V, V_{OUT} = AGND = DGND = 0 V, V_{DD} = +15V unless otherwise specified.
- 2/ DAC loaded with 0000 0000 0000.
- 3/ Measured using internal feedback resistor and includes effect of 5 ppm maximum gain T_C.
- 4/ If not tested, shall be guaranteed to the limits specified in table I herein.
- 5/ Feedthrough error can be reduced by connecting the metal lid to ground.
- 6/ See 4.3.1c.
- 7/ Timing in accordance with figure 2.
- 8/ Subgroups 10 and 11 guaranteed, if not tested, to the limits specified in table I herein.

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

3.8 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-88778
	REVISION LEVEL	SHEET 6

Case outlines	R and 2
Terminal number	Terminal symbol
1	OUT
2	AGND
3	DGND
4	(MSB)DB11
5	DB10
6	DB9
7	DB8
8	DB7
9	DB6
10	DB5
11	DB4
12	DB3
13	DB2
14	DB1
15	DB0(LSB)
16	\overline{CS}
17	\overline{WR}
18	VDD
19	VREF
20	RFB

Mode selection

Write mode

\overline{CS} and \overline{WR} low, DAC responds to data bus (DB0-DB11 inputs).

Hold mode

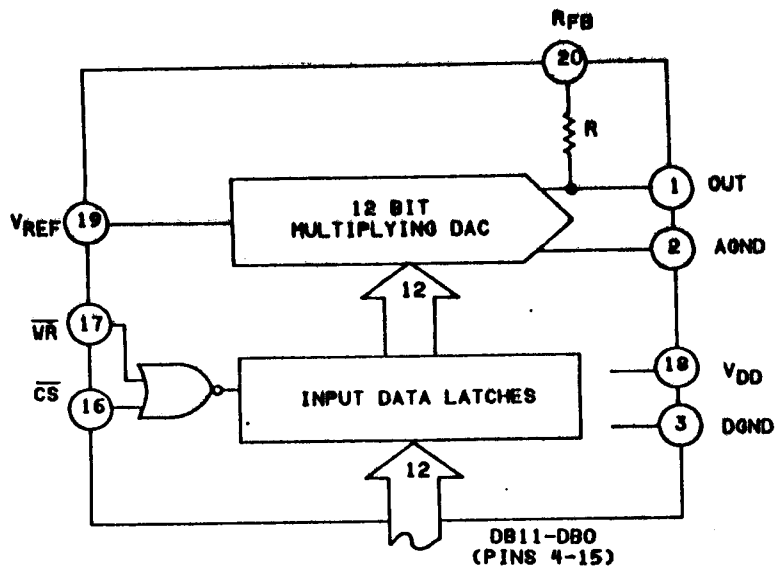
Either \overline{CS} or \overline{WR} high, data bus (DB0-DB11) is locked out; DAC holds last data present when \overline{WR} or \overline{CS} assumed high state.

FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 7

DESC FORM 193A
SEP 87

★ U.S. GOVERNMENT PRINTING OFFICE: 1987 - 748-129-60913



Write cycle timing diagram

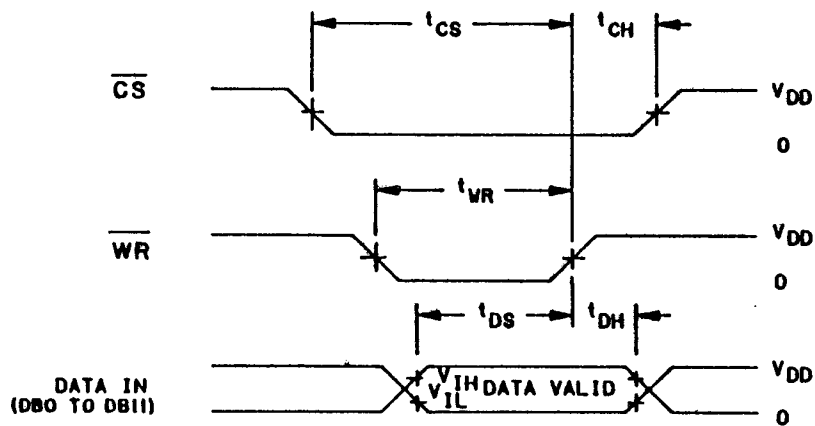


FIGURE 2. Functional and timing diagram.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 8

DESC FORM 193A
SEP 87

☆ U.S. GOVERNMENT PRINTING OFFICE: 1987 - 748-129-609/3

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.

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7 and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.
- c. Subgroup 4 (capacitance measurement) shall be measured only for the initial test and after process or design changes which may affect capacitance. Sample size is fifteen devices, all input and output terminals tested, and no failures.

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 3.5 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.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 9

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3
Group A test requirements (method 5005)	1,2,3,4,5,6, 9,10**,11**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

** Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

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

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88778
		REVISION LEVEL	SHEET 10

DESC FORM 193A
SEP 87

* U. S. GOVERNMENT PRINTING OFFICE: 1988-549-904

6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>
5962-8877801RX	06665	PM7645AR/883B
5962-88778012X	06665	PM7645ARC/883B
5962-8877802RX	06665	PM7645BR/883B
5962-88778022X	06665	PM7645BRC/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.

Vendor CAGE number

06665

Vendor name and address

Precision Monolithics, Incorporated
1500 Space Park Drive
Santa Clara, CA 95050

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A	5962-88778	
		REVISION LEVEL	SHEET 11

DESC FORM 193A
SEP 87

★ U. S. GOVERNMENT PRINTING OFFICE: 1988-549-904