REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add vendor CAGE 34335. Add vendor CAGE U4637. Editorial changes throughout.	87-04-16	M. A. Frye
B	Add device types 02, 03, and 04. Editorial changes throughout.	87-12-21	M. A. Frye
C	Change vendor CAGE 12969 to 48726. Change max duty cycle min limit. Add vendor CAGE U4637 for additional devices, also change name from Integrated Power to Seagate Microelectronics. Add vendor CAGE 34333 for additional devices. Add testing for delay to output, rise time, and fall time tests. Editorial change throughout.	89-10-10	M. A. Frye
D	Add packages C, E, F, 2, H, and X. Change unity gain bandwidth limit. Editorial changes throughout.	92-11-23	M.A. FRYE
E	Add device types 05, 06, 07, and 08. Add vendor CAGE 48726 for device type 05, 06, 07, and 08. Changes to table I electricals. Delete vendor CAGE U4637 from drawing. Add vendor CAGE U3158. Editorial changes throughout.	93-09-10	M.A. FRYE

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

REV																			
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REV																			
SHEET																			

REV STATUS OF SHEETS	REV	E	E	D	E	E	E	D	E	C	D			
	SHEET	1	2	3	4	5	6	7	8	9	10			

PMIC N/A

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DRAWING APPROVAL DATE
86-11-10

REVISION LEVEL
E

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

MICROCIRCUIT, LINEAR, PROGRAMMABLE PRIMARY SIDE PULSE WIDTH MODULATOR, MONOLITHIC SILICON

SIZE	CAGE CODE	5962-86704
A	14933	

SHEET 1 OF 10

DESC FORM 193-1
JUL 91

5962-E257-93

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

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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:

5962-86704	01	C	X
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

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

Device type	Generic number	Circuit function
01	1842	Off-line current mode pulse width modulator controller
02	1843	Off-line current mode pulse width modulator controller
03	1844	Off-line current mode pulse width modulator controller
04	1845	Off-line current mode pulse width modulator controller
05	1842A	Off-line current mode pulse width modulator controller
06	1843A	Off-line current mode pulse width modulator controller
07	1844A	Off-line current mode pulse width modulator controller
08	1845A	Off-line current mode pulse width modulator controller

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

Outline letter	Descriptive designator	Terminals	Package style
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
E	GDIP1-T16 or CDIP2-T16	16	Dual-in-line
F	GDFP2-F16 or CDFP3-F16	16	Flat pack
H	GDFP1-F10 or CDFP2-F10	10	Flat pack
P	GDIP1-T8 OR CDIP2-T8	8	Dual-in-line
X	CQCC1-N20	20	Square leadless chip carrier
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/ 2/

Supply voltage (V_{CC})	30 V
Output current	±1.0 A
Output energy (capacitive load)	5.0 μJ
Analog input voltage (pins 2 and 3)	-0.3 V to +6.3 V
Error amplifier output sink current	10 mA
Power dissipation (P_D)(T_A = +25°C)	1.0 W 3/
Thermal resistance, junction-to-case (Θ_{JC})	See MIL-STD-1835
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature (T_J)	+150°C

1/ All voltages are with respect to ground, and all currents are positive when flowing into the specified terminal.
2/ All references to pin numbers are for case outline P.
3/ Derate at 8.0 mW/°C above T_A = +25°C for case P, 10 mW/°C above T_A = +50°C for cases C and E, 8.7 mW/°C above T_A = +25°C for case F, 9.0 mW/°C above T_A = +40°C for cases 2 and X, and 6.9 mW/°C above T_A = +25°C for case H.

1.4 Recommended operating conditions.

Supply voltage (V_{CC}) - +15 V ±5.0 percent
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.

STANDARD

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 Logic diagram. The logic diagram shall be as specified on figure 2.

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 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).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ 1/ unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
REFERENCE SECTION						
Reference output voltage	V_{REF}	I_O = 1.0 mA, T_J = +25°C	1	4.95	5.05	V
Line regulation	V_{RLINE}	12 V $\le V_{IN} \le$ 25 V	1, 2, 3		20	mV
Load regulation	V_{RLOAD}	1.0 mA $\le I_O \le$ 20 mA	1, 2, 3		25	mV
Total output variation		Line, load, and temperature 2/	1, 2, 3	4.90	5.10	V
Long term stability 2/		T_A = +125°C, 1,000 hours, V_{REF}	2		25	mV
Output short-circuit current	I_{OS}		1, 2, 3	-30	-180	mA
OSCILLATOR SECTION						
Initial accuracy		T_J = +25°C 3/	4	47	57	kHz
Voltage stability		12 V $\le V_{CC} \le$ 25 V	4, 5, 6		1.0	%
Discharge current		V_{PIN4} = 2 V Device types 05, 06, 07 and 08	1	7.8	8.8	mA
			2, 3	7.5	8.8	
ERROR AMP SECTION						
Input voltage	V_{IN}	$V_{PIN\ 1}$ = 2.5 V	1, 2, 3	2.45	2.55	V
Input bias current	I_{IB}		1, 2, 3		-1.0	µA
Open loop voltage gain	A_{VOL}	2.0 V $\le V_O \le$ 4.0 V	4, 5, 6	65		dB
Unity gain bandwidth	GBW	2/	4, 5, 6	0.55		MHz
Power supply rejection ratio	PSRR	12 V $\le V_{CC} \le$ 25 V	4, 5, 6	60		dB

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ 1/ unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
Output sink current	I_{SINK}	$V_{PIN\ 2}$ = 2.7 V, $V_{PIN\ 1}$ = 1.1 V	1, 2, 3	2.0		mA
Output source current	I_{SOURCE}	$V_{PIN\ 2}$ = 2.3 V, $V_{PIN\ 1}$ = 5.0 V	1, 2, 3	-0.5		mA
V_{OUT} high	V_{OH}	$V_{PIN\ 2}$ = 2.3 V, R_L = 15 kΩ to ground	1, 2, 3	5.0		V
V_{OUT} low	V_{OL}	$V_{PIN\ 2}$ = 2.7 V, R_L = 15 kΩ to pin 8	1, 2, 3		1.1	V
CURRENT SENSE SECTION						
Gain	A	4/ 5/	4, 5, 6	2.85	3.15	V/V
Maximum input signal		$V_{PIN\ 1}$ = 5.0 V 4/	4, 5, 6	0.9	1.1	V
Input bias current	I_{IB}		1, 2, 3		-10	μA
Delay to output	t_d	$V_{PIN\ 2}$ = 0 V $V_{PIN\ 3}$ = 2 V (step input) 2/	9		300	ns
			10, 11		400	
OUTPUT SECTION						
Output low voltage	V_{OL}	I_{SINK} = 20 mA	1, 2, 3		0.4	V
		I_{SINK} = 200 mA	1, 2, 3		2.2	V
Output high voltage	V_{OH}	I_{SOURCE} = 20 mA	1, 2, 3	13		V
		I_{SOURCE} = 200 mA	1, 2, 3	12		V

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ 1/ unless otherwise specified		Group A subgroups	Limits Min	Limits Max	Unit
Rise time	t_r	C_L = 1,000 pF 2/		9		150	ns
				10, 11		200	
Fall time	t_f	C_L = 1,000 pF 2/		9		150	ns
				10, 11		200	
UVLO saturation voltage	$UVLO_{SAT}$	V_{CC} = 5 V, I_{SINK} = 10 mA, Device types 05, 06, 07, and 08		1, 2, 3		1.2	V
UNDER-VOLTAGE LOCKOUT SECTION							
Start threshold	V_{TH}		Device types 01,03,05,07	1, 2, 3	15	17	V
			02,04,06,08		7.8	9.0	
Minimum operating voltage	V_{MIN}	After turn-on	Device types 01,03,05,07	1, 2, 3	9.0	11	V
			02,04,06,08		7.0	8.2	
PWM SECTION							
Maximum duty cycle	t_{ON}/t_{OSC} max		Device types 01,02,05,06	1, 2, 3	93	100	%
			03,04,07,08		46	50	
Minimum duty cycle	t_{ON}/t_{OSC} min		All devices	1, 2, 3		0	%
TOTAL STANDBY CURRENT							
Start-up current	I_{START}			1, 2, 3		1.0	mA
Operating supply current	I_{CC}	$V_{PIN\ 2} = V_{PIN\ 3}$ = 0 V		1, 2, 3		17	mA

1/ $T_A = T_J$. Characteristics apply at V_{CC} = 15 V (adjust V_{CC} above the start threshold before setting at 15 V), R_T = 10 kΩ and C_T = 3.3 nF unless otherwise specified. All references to pin numbers are for case outline P.

2/ These parameters are guaranteed if not tested.

3/ Output frequency equals oscillator frequency for device types 01, 02, 05, and 06. Output frequency is one half oscillator frequency for device types 03, 04, 07, and 08.

4/ Parameter measured at trip point of latch with V_{FB} = 0 V.

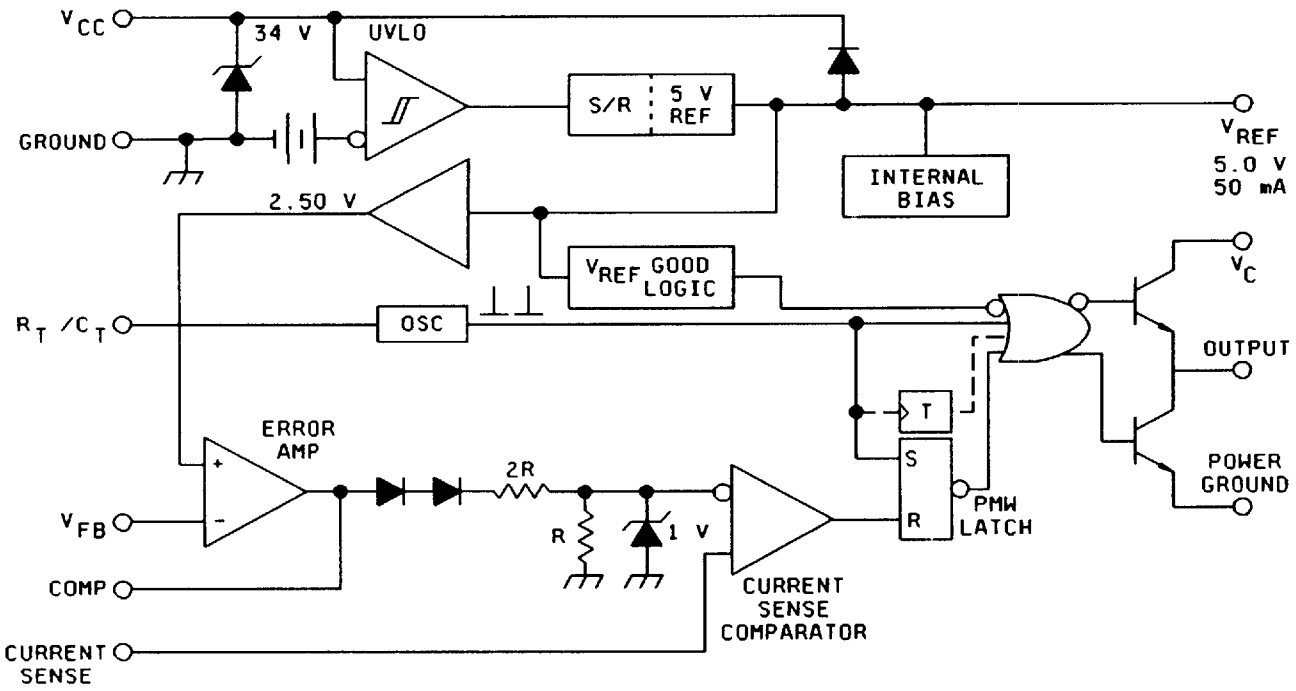
5/ Gain is defined as:

$$A = \frac{\Delta V_{COMP}}{\Delta V_{ISENSE}};\ 0\ V \le V_{ISENSE} \le 0.8\ V$$

Device type	All	All	All	All	All
Case outline	C	H	P	2	X
Terminal number	Terminal symbol	Terminal symbol	Terminal symbol	Terminal symbol	Terminal symbol
1	COMP	COMP	COMP	N.C.	N.C.
2	N.C.	V_{FB}	V_{FB}	COMP	COMP
3	V_{FB}	I_{SENSE}	I_{SENSE}	N.C.	N.C.
4	N.C.	R_T/C_T	R_T/C_T	N.C.	N.C.
5	I_{SENSE}	POWER GND	GROUND	V_{FB}	V_{FB}
6	N.C.	GROUND	OUTPUT	N.C.	N.C.
7	R_T/C_T	OUTPUT	V_{CC}	I_{SENSE}	I_{SENSE}
8	POWER GND	V_C	V_{REF}	N.C.	N.C.
9	GROUND	V_{CC}	---	N.C.	N.C.
10	OUTPUT	V_{REF}	---	R_T/C_T	R_T/C_T
11	V_C	---	---	N.C.	N.C.
12	V_{CC}	---	---	GROUND	PWR GND
13	N.C.	---	---	N.C.	GROUND
14	V_{REF}	---	---	N.C.	N.C.
15	---	---	---	OUTPUT	OUTPUT
16	---	---	---	N.C.	N.C.
17	---	---	---	V_{CC}	V_C
18	---	---	---	N.C.	V_{CC}
19	---	---	---	N.C.	N.C.
20	---	---	---	V_{REF}	V_{REF}

NOTE: Case outlines E and F are not available from an approved source.

FIGURE 1. Terminal connections.



NOTE: Toggle flip flop used only in device types 03, 04, 07, and 08.

FIGURE 2. Logic diagram.

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.

(2) T_A = +125°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.

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°C, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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
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 9, 10, and 11 are guaranteed if not tested to the limits specified 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 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.