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INTEGRATED CIRCUITS, SILICON MONOLITHIC,

REGULATING PULSE WIDTH MODULATOR,

BASED ON TYPE SG1525A

ESA/SCC Detail Specification No. 9108/011

space components
coordination group

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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
'A'	June '95	P1. Cover page		None
		P2. DCN		None
		P8. Figure 2	: In the table, dimensions A and B min amended	221256
		P22. Table 2	: No. 38, Max. Limit amended	23710
		P30. Table 3	: No. 38, Max. Limit amended	23710

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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a silicon monolithic, Regulating Pulse Width Modulator based on Type SG1525A. It shall be read in conjunction with ESA/SCC Generic Specification No. 9000, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic type integrated circuits specified herein, which are also covered by this specification, are given in Table 1(a).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the integrated circuits specified herein, are as scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

The parameter derating information for the integrated circuits specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the integrated circuits specified herein are shown in Figure 2.

1.6 PIN ASSIGNMENT

As per Figure 3(a).

1.7 TRUTH TABLE (FIGURE 3(b))

Not applicable.

1.8 CIRCUIT SCHEMATIC (FIGURE 3(c))

Not applicable.

1.9 FUNCTIONAL DIAGRAM

As per Figure 3(d).

TABLE 1(a) - TYPE VARIANTS

VARIANT	CASE	FIGURE	LEAD MATERIAL AND FINISH
03	D.I.L.	2	G2 or G8
04	D.I.L.	2	G4

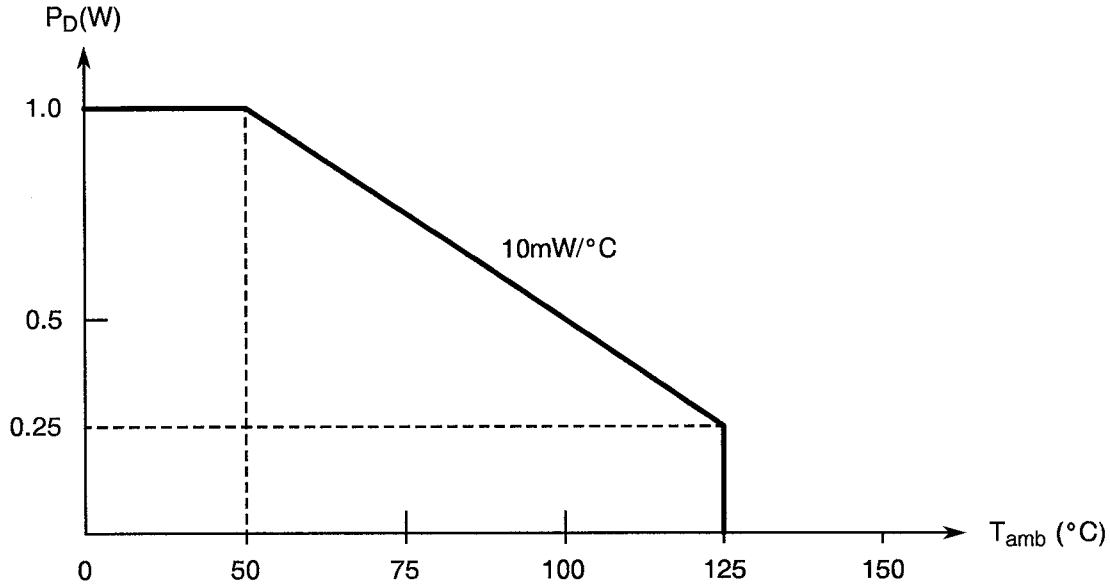
TABLE 1(b) - MAXIMUM RATINGS

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Supply Voltage	$+V_{IN}$	40	V	-
2	Collector Supply Voltage	V_{CC}	40	V	-
3	Logic Inputs	V_{log}	−0.3 to +5.5	V	-
4	Analog Inputs	V_{an}	−0.3 to $+V_{IN}$	V	-
5	Output Current (Source or Sink)	$\pm I_{OUT}$	500	mA	-
6	Reference Output Current	I_{REF}	50	mA	-
7	Oscillator Charging Current	I_{OSC}	5.0	mA	-
8	Device Dissipation	P_D	1.0	W	Note 1
9	Operating Temperature Range	T_{op}	−55 to +125	°C	T_{amb}
10	Storage Temperature Range	T_{stg}	−65 to +150	°C	-
11	Soldering Temperature	T_{sol}	+300	°C	Note 2
12	Junction Temperature	T_J	+150	°C	-
13	Thermal Resistance: Junction to Ambient Junction to Case	 $R_{TH(J-A)}$ $R_{TH(J-C)}$	 100 60	°C/W	-

NOTES

1. At T_{amb} = +50°C. For derating at T_{amb} > +50°C, see Figure 1.
2. Duration 10 seconds maximum at a distance of not less than 1.5mm from the device body, and the same lead shall not be resoldered until 3 minutes have elapsed.

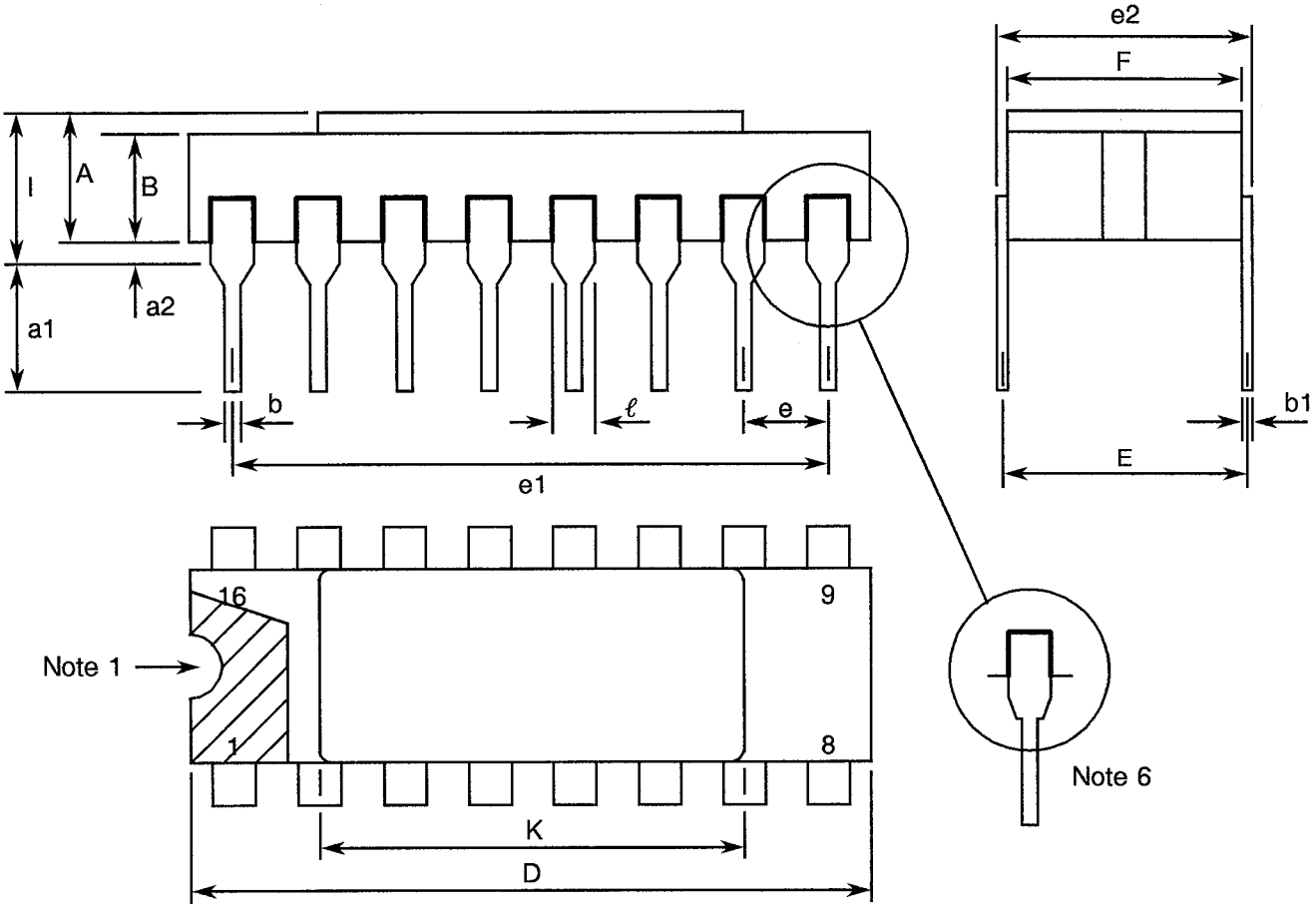
FIGURE 1 - PARAMETER DERATING INFORMATION



Rated Power Versus Temperature

FIGURE 2 - PHYSICAL DIMENSIONS

DUAL-IN-LINE PACKAGE, 16-PIN



SYMBOL	MILLIMETRES		NOTES
	MIN	MAX	
A	2.10	2.71	
a1	3.00	3.70	
a2	0.63	1.14	2
B	1.82	2.39	
b	0.40	0.50	3
b1	0.20	0.30	3
D	20.06	20.58	
E	7.36	7.87	
e	2.54 TYPICAL		4, 5
e1	17.65	17.90	
e2	7.62	8.12	
F	7.29	7.70	
I	-	3.83	
K	10.90	12.10	
ℓ	1.14	1.50	3

NOTES: See Page 9.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

NOTES TO FIGURE 2

1. Index area: a notch, letter or dot shall be located adjacent to Pin 1 and shall be within the shaded area shown.
2. The dimension shall be measured from the seating plane to the base plane.
3. All leads or terminals.
4. The true position pin spacing is 2.54mm between centrelines. Each pin centreline shall be located within ± 0.25mm of its true longitudinal position relative to Pin 1 and the highest pin number.
5. 14 spaces.
6. For all pins, either pin shape may be supplied.

FIGURE 3(a) - PIN ASSIGNMENT

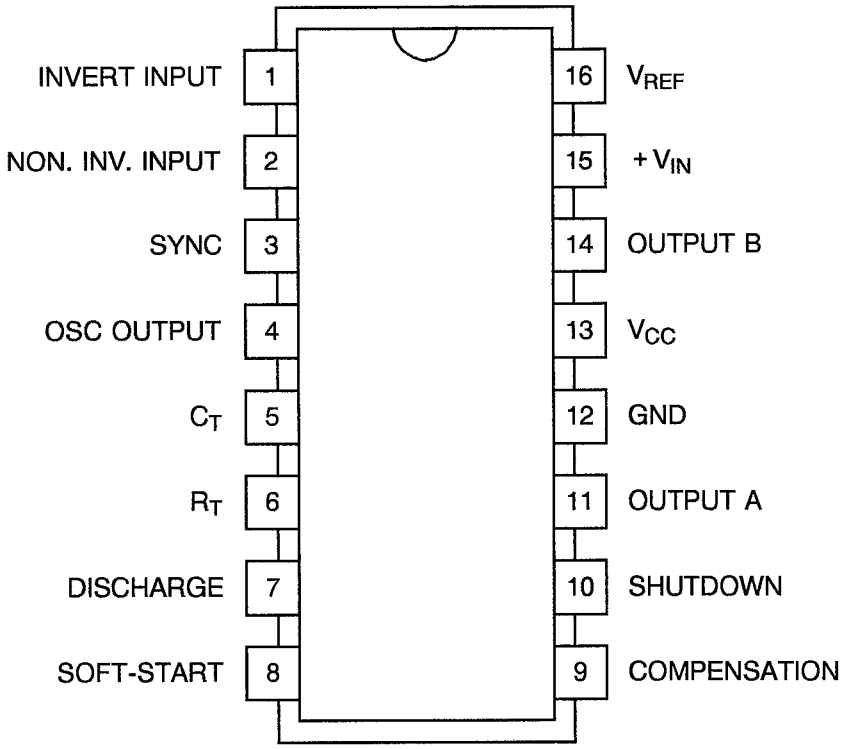


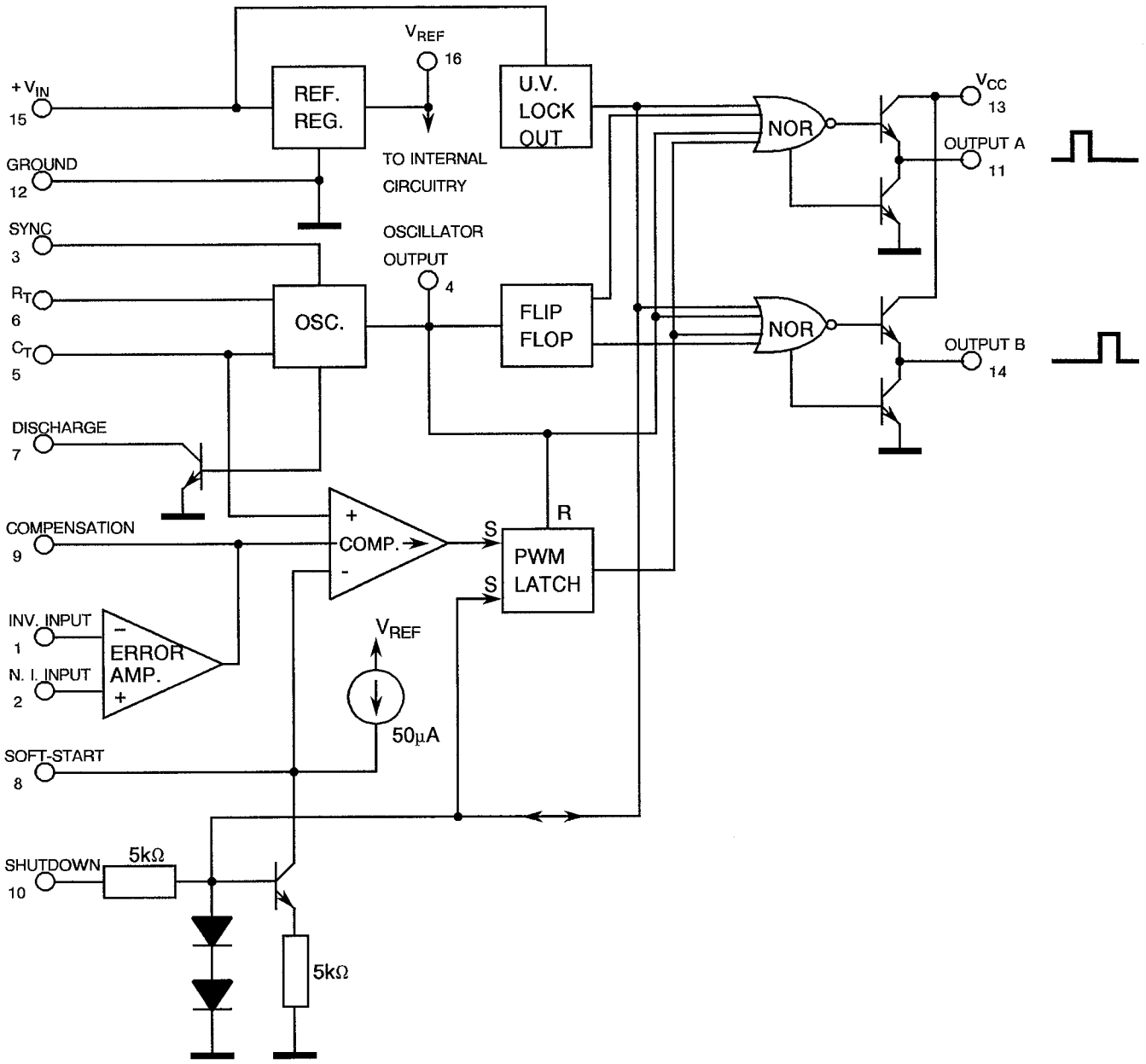
FIGURE 3(b) - TRUTH TABLE

Not applicable.

FIGURE 3(c) - CIRCUIT SCHEMATIC

Not applicable.

FIGURE 3(d) - FUNCTIONAL DIAGRAM



2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:-

(a) ESA/SCC Generic Specification No. 9000 for Integrated Circuits.

(b) MIL-STD-883, Test Methods and Procedures for Micro-electronics.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply. In addition, the following symbols are used:

V_{REF} = Reference Output Voltage
I_{CC} = Supply Current
K_{line} = Line Regulation
K_{load} = Load Regulation
I_{OS} = Short Circuit Current
V_{STAB} = Voltage Stability
P_W = Clock Width
f_{max} = Maximum Frequency
f_{min} = Minimum Frequency
MXPKCT = Input Threshold Maximum Frequency
MNPKCT = Input Threshold Zero Duty Cycle
T_{SYNC} = Synchronous Threshold
I_{SYNC} = Synchronous Input Current
MINDC = Minimum Duty Cycle
MAXDC = Maximum Duty Cycle
I_M = Current Mirror
S_{SC} = Softstart Current
S_{SV} = Softstart Low Level Voltage
I_{IS} = Shutdown Input Current
I_{CL} = Collector Leakage Current
SDTHS = Shutdown Threshold Voltage
U_{VL} = Under Voltage Lockout
V_{IO} = Input Offset Voltage
I_{IB} = Input Bias Current
I_{IO} = Input Offset Current
PSRR = Power Supply Rejection Ratio
A_{VS} = DC Open Loop Voltage Gain
CMRR = Common Mode Rejection Ratio

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the integrated circuits specified herein are stated in this specification and ESA/SCC Generic Specification No. 9000 for Integrated Circuits. Deviations from the Generic Specification, applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

None.

4.2.2 Deviations from Final Production Tests (Chart II)

None.

4.2.3 Deviations from Burn-in Tests (Chart III)

(a) Para. 7.1.1(a), "High Temperature Reverse Bias (H.T.R.B.)" tests and subsequent electrical measurements related to this test shall be omitted.

4.2.4 Deviations from Qualification Tests (Chart IV)

None.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the integrated circuits specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight

The maximum weight of the integrated circuits specified herein shall be 2.2 grammes.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the integrated circuits specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Case

The case shall be hermetically sealed and have a ceramic body and the lids shall be preform-soldered.

4.4.2 Lead Material and Finish

The material shall be Type 'G' with either Type '2 or 8' or Type '4' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500. (See Table 1(a) for Type Variants).

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700. Each component shall be marked in respect of:-

(a) Lead Identification.

(b) The SCC Component Number.

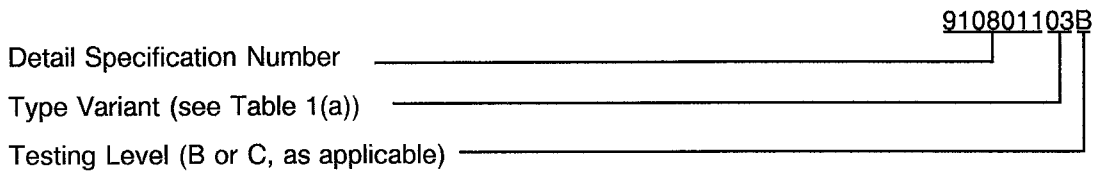
(c) Traceability Information.

4.5.2 Lead Identification

An index shall be located at the top of the package in the position as defined in Note 1 to Figure 2, or alternatively, a tab may be used to identify Pin No. 1. The pin numbering must be read with the index or tab on the left-hand side.

4.5.3 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:



4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at T_{amb} = +25 ±3 °C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. The measurements shall be performed at T_{amb} = +125(+0-5) °C and -55(+5-0) °C respectively.

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing electrical measurements listed in Tables 2 and 3 of this specification are shown in Figure 4.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to Power Burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb} = +25 \pm 3$ °C. The parameter drift values (Δ) applicable to the parameters scheduled, shall not be exceeded. In addition to these drift value requirements, the appropriate limit value specified for a given parameter in Table 2 shall not be exceeded.

4.7.2 Conditions for H.T.R.B. Burn-in

Not applicable.

4.7.3 Conditions for Power Burn-in

The requirements for power burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 9000. The conditions for power burn-in shall be as specified in Table 5 of this specification.

4.7.4 Electrical Circuit for H.T.R.B. Burn-in

Not applicable.

4.7.5 Electrical Circuit for Power Burn-in

A circuit for use in performing power burn-in tests are shown in Figure 5 of this specification.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
1	Reference Output Voltage	V_{REF}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF I_{REF} = 20mA (Pin 16)	5.05	5.15	V
2	Line Regulation Voltage (ΔV_{REF})	K_{line}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 8.0 to 35V C = 470pF I_{REF} = 20mA (Pin 16)	-	±20	mV
3	Load Regulation Voltage (ΔV_{REF})	K_{load}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF I_{REF} = 0 to 20mA (Pin 16)	−50	-	mV
4	Short Circuit Current	I_{OS}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF V_{REF} (Pin 16) = GND (Note 1) (Pin 16)	-	100	mA
5	Input Offset Voltage	V_{IO}	4001	4(b)	V_{IN} (Pin 2) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C1 = 100nF, C2 = 10nF R1 = 3.6kΩ, R2 = 10kΩ (Pins 1 to 2)	−5.0	5.0	mV
6	Input (Minus) Bias Current	I_{-IB}	4001	4(c)	V_{IN} (Pin 1) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C1 = 100nF, C2 = 10nF R1 = 3.6kΩ, R2 = 10kΩ (Pin 1)	-	10	µA
7	Input (Plus) Bias Current	I_{+IB}	4001	4(d)	V_{IN} (Pin 2) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C1 = 100nF, C2 = 10nF R1 = 3.6kΩ, R2 = 10kΩ (Pin 2)	-	10	µA

NOTES: See Page 21.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
8	Input Offset Current	I_{IO}	4001	-	$I_{-IB} - I_{+IB}$	−1.0	1.0	µA
9	DC Open Loop Voltage Gain	A_{VS}	4004	4(e)	V_{IN} (Pins 2,3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 100nF R1 = 3.6kΩ, R2 = 1.0MΩ V_{OUT} (Pin 9) = 1.4 to 3.4V (Pins 1 to 2)	60	-	dB
10	Output Voltage Low Level	V_{OL}	4004	4(f)	V_{IN} (Pin 1) = 2.5V V_{IN} (Pins 2,3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 100nF (Pin 9)	-	0.5	V
11	Output Voltage High Level	V_{OH}	4004	4(f)	V_{IN} (Pin 2) = 2.5V V_{IN} (Pins 1,3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 100nF (Pin 9)	3.8	-	V
12	Common Mode Rejection Ratio	CMRR	4003	4(g)	V_{IN} (Pins 1,2) = 1.5V to 5.2V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 100nF R = 3.6kΩ (Pins 1 to 2)	60	-	dB
13	Power Supply Rejection Ratio	PSRR	4003	4(h)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 8.0 to 35V C = 100nF R = 3.6kΩ	50		dB
14	Input Threshold Max. Duty Cycle	MXPKCT	-	4(i)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 6) = (Pin 16) C = 100nF (Pin 5)	-	3.6	V

NOTES: See Page 21.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
15	Input Threshold Zero Duty Cycle	MNPKCT	-	4(i)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 6) = (Pin 16) C = 100nF (Pin 5)	0.68	1.2	V
16	Softstart Current	S_{SC}	-	4(j)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V V_{IN} (Pin 8) = 0V (Pin 8)	−25	−80	µA
17	Softstart Low Level	S_{SV}	-	4(k)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V V_{IN} (Pin 10) = 2.5V (Pin 8)	-	0.7	V
18	Shutdown Input Current	I_{IS}	-	4(k)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V V_{IN} (Pin 10) = 2.5V (Pin 10)	-	1.0	mA
19	Shutdown Threshold Voltage A	SDTHSA	-	4(l)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,12) = GND V_{IN} (Pin 5) = 0V V_{IN} (Pin 6) = (Pin 16) + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 9) = 6.0V V_{IN} (Pin 10) = 0 to 1.5V (Pin 10)	0.6	1.0	V
20	Shutdown Threshold Voltage B	SDTHSB	-	4(l)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,12) = GND V_{IN} (Pin 5) = 0V V_{IN} (Pin 6) = (Pin 16) + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 9) = 6.0V V_{IN} (Pin 10) = 0 to 1.5V (Pin 10)	0.6	1.0	V

NOTES: See Page 21.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
21	Output Voltage Low Level A1	V_{OLA1}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 11) = 20mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 11)	0.01	0.4	V
22	Output Voltage Low Level A2	V_{OLA2}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 11) = 100mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 11)	-	2.0	V
23	Output Voltage Low Level B1	V_{OLB1}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 14) = 20mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 14)	0.01	0.4	V
24	Output Voltage Low Level B2	V_{OLB2}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 14) = 100mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 14)	-	2.0	V
25	Output Voltage High Level A1	V_{OHA1}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −20mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 11)	18	-	V

NOTES: See Page 21.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
26	Output Voltage High Level A2	V_{OHA2}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −100mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 11)	17	-	V
27	Output Voltage High Level B1	V_{OHB1}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −20mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 14)	18	-	V
28	Output Voltage High Level B2	V_{OHB2}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −100mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 14)	17	-	V
29	Under-voltage Lockout	U_{VL}	-	4(o)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 13) = 10V V_{IN} (Pin 9) = 6.0V + V_{IN} (Pin 15) = 10.5 to 5.0V (Pin 15)	6.0	8.0	V
30	Collector Leakage Current	I_{CL}	-	4(p)	V_{IN} (Pins 1,2,10) = 2.5V V_{IN} (Pin 5) = 2.0V V_{IN} (Pins 3,12) = GND V_{IN} (Pin 13) = 35V + V_{IN} (Pin 15) = 20V V_{IN} (Pin 9) = 0V (Pin 13)	-	50	µA

NOTES: See Page 21.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
31	Current Mirror	I_M	-	4(q)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,8,10,12) = GND I_{IN} (Pin 6) = −2.0mA +V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V (Pin 5)	−1.7	−2.2	mA
32	Sync. Threshold	T_{SYNC}	-	4(r)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 10,12) = GND +V_{IN} (Pin 15) = 20V V_{IN} (Pin 3) = 0 to 5.0V C = 10nF (Pin 3)	1.2	2.8	V
33	Sync. Input Current	I_{SYNC}	-	4(s)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 4,10,12) = GND V_{IN} (Pin 13) = 10V +V_{IN} (Pin 15) = 20V C = 100nF R = 3.6kΩ V_{IN} (Pin 3) = 3.5V (Pin 3)	0.4	2.5	mA
34	Voltage Stability	V_{STAB}	-	4(t)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 8.0 to 35V C = 10nF R = 3.6kΩ (Pin 4)	−1.0	1.0	%
35	Supply Current	I_{CC}	3005	4(u)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 35V C = 470pF (Pin 15)	-	20	mA

NOTES

1. Should be shorted for 5 seconds maximum.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
36	Minimum Frequency	f_{MIN}	-	4(v)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 100nF R = 200kΩ (Pin 4)	50	120	Hz
37	Maximum Frequency	f_{MAX}	-	4(v)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF R = 2.0kΩ (Pin 4)	400	-	kHz
38	Clock Pulse Width	P_W	-	4(v)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ (Pin 4)	0.3	1.4	µs
39	Minimum Duty Cycle A	MINDCA	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 0.7V (Pin 11)	-	0	%
40	Minimum Duty Cycle B	MINDCB	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 0.7V (Pin 14)	-	0	%
41	Maximum Duty Cycle A	MAXDCA	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 3.6V (Pin 11)	45	50	%

NOTES: See Page 21.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
42	Maximum Duty Cycle B	MAXDCB	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 3.6V (Pin 14)	45	50	%

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - d.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
1	Reference Output Voltage	V_{REF}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF I_{REF} = 20mA (Pin 16)	5.0	5.2	V
2	Line Regulation Voltage (ΔV_{REF})	K_{line}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 8.0 to 35V C = 470pF I_{REF} = 20mA (Pin 16)	-	±20	mV
3	Load Regulation Voltage (ΔV_{REF})	K_{load}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF I_{REF} = 0 to 20mA (Pin 16)	−100	-	mV
4	Short Circuit Current	I_{OS}	-	4(a)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF V_{REF} (Pin 16) = GND (Note 1) (Pin 16)	-	130	mA
5	Input Offset Voltage	V_{IO}	4001	4(b)	V_{IN} (Pin 2) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C1 = 100nF, C2 = 10nF R1 = 3.6kΩ, R2 = 10kΩ (Pins 1 to 2)	−5.0	5.0	mV
6	Input (Minus) Bias Current	I_{-IB}	4001	4(c)	V_{IN} (Pin 1) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C1 = 100nF, C2 = 10nF R1 = 3.6kΩ, R2 = 10kΩ (Pin 1)	-	10	µA
7	Input (Plus) Bias Current	I_{+IB}	4001	4(d)	V_{IN} (Pin 2) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C1 = 100nF, C2 = 10nF R1 = 3.6kΩ, R2 = 10kΩ (Pin 2)	-	10	µA

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
8	Input Offset Current	I_{IO}	4001	-	$I_{-IB} - I_{+IB}$	−1.0	1.0	µA
9	DC Open Loop Voltage Gain	A_{VS}	4004	4(e)	V_{IN} (Pins 2,3,10,12) = GND +V_{IN} (Pin 15) = 20V C = 100nF R1 = 3.6kΩ, R2 = 1.0MΩ V_{OUT} (Pin 9) = 1.4 to 3.4V (Pins 1 to 2)	60	-	dB
10	Output Voltage Low Level	V_{OL}	4004	4(f)	V_{IN} (Pin 1) = 2.5V V_{IN} (Pins 2,3,10,12) = GND +V_{IN} (Pin 15) = 20V C = 100nF (Pin 9)	-	0.5	V
11	Output Voltage High Level	V_{OH}	4004	4(f)	V_{IN} (Pin 2) = 2.5V V_{IN} (Pins 1,3,10,12) = GND +V_{IN} (Pin 15) = 20V C = 100nF (Pin 9)	3.8	-	V
12	Common Mode Rejection Ratio	CMRR	4003	4(g)	V_{IN} (Pins 1,2) = 1.5V to 5.2V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 20V C = 100nF R = 3.6kΩ (Pins 1 to 2)	60	-	dB
13	Power Supply Rejection Ratio	PSRR	4003	4(h)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 8.0 to 35V C = 100nF R = 3.6kΩ	50		dB
14	Input Threshold Max. Duty Cycle	MXPKCT	-	4(i)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 20V V_{IN} (Pin 6) = (Pin 16) C = 100nF (Pin 5)	3.0	4.0	V

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
15	Input Threshold Zero Duty Cycle	MNPKCT	-	4(i)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 6) = (Pin 16) C = 100nF (Pin 5)	0.5	1.4	V
16	Softstart Current	S_{SC}	-	4(j)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V V_{IN} (Pin 8) = 0V (Pin 8)	−25	−80	µA
17	Softstart Low Level	S_{SV}	-	4(k)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V V_{IN} (Pin 10) = 2.5V (Pin 8)	-	0.7	V
18	Shutdown Input Current	I_{IS}	-	4(k)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,12) = GND + V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V V_{IN} (Pin 10) = 2.5V (Pin 10)	-	1.0	mA
19	Shutdown Threshold Voltage A	SDTHSA	-	4(l)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,12) = GND V_{IN} (Pin 5) = 0V V_{IN} (Pin 6) = (Pin 16) + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 9) = 6.0V V_{IN} (Pin 10) = 0 to 1.5V (Pin 10)	0.4	1.2	V
20	Shutdown Threshold Voltage B	SDTHSB	-	4(l)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,12) = GND V_{IN} (Pin 5) = 0V V_{IN} (Pin 6) = (Pin 16) + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 10) = 0 to 1.5V V_{IN} (Pin 9) = 6.0V (Pin 10)	0.4	1.2	V

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
21	Output Voltage Low Level A1	V_{OLA1}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 11) = 20mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 11)	0.01	0.4	V
22	Output Voltage Low Level A2	V_{OLA2}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 11) = 100mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 11)	-	2.1	V
23	Output Voltage Low Level B2	V_{OLB1}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 14) = 20mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 14)	0.01	0.4	V
24	Output Voltage Low Level B2	V_{OLB2}	-	4(m)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND I_{OUT} (Pin 14) = 100mA + V_{IN} (Pin 15) = 20V = (Pin 13) C = 100nF V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 0V (Pin 14)	-	2.1	V
25	Output Voltage High Level A1	V_{OHA1}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −20mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 11)	18	-	V

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
26	Output Voltage High Level A2	V_{OHA2}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −100mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 11)	17	-	V
27	Output Voltage High Level B1	V_{OHB1}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −20mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 14)	18	-	V
28	Output Voltage High Level B2	V_{OHB2}	-	4(n)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V I_{OUT} (Pin 11) = −100mA + V_{IN} (Pin 15) = 20V = (Pin 13) V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 9) = 6.0V (Pin 14)	17	-	V
29	Under-voltage Lockout	U_{VL}	-	4(o)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 5) = 0V V_{IN} (Pin 6) = (Pin 16) V_{IN} (Pin 13) = 10V V_{IN} (Pin 9) = 6.0V + V_{IN} (Pin 15) = 10.5 to 5.0V (Pin 15)	6.0	8.0	V
30	Collector Leakage Current	I_{CL}	-	4(p)	V_{IN} (Pins 1,2,10) = 2.5V V_{IN} (Pin 5) = 2.0V V_{IN} (Pins 3,12) = GND V_{IN} (Pin 13) = 35V + V_{IN} (Pin 15) = 20V V_{IN} (Pin 9) = 0V (Pin 13)	-	200	µA

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - d.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
31	Current Mirror	I_M	-	4(q)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,8,10,12) = GND I_{IN} (Pin 6) = −2.0mA +V_{IN} (Pin 15) = 20V V_{IN} (Pin 5) = 0V (Pin 5)	−1.7	−2.2	mA
32	Sync. Threshold	T_{SYNC}	-	4(r)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 10,12) = GND +V_{IN} (Pin 15) = 20V V_{IN} (Pin 3) = 0 to 5.0V C = 10nF (Pin 3)	1.2	2.8	V
33	Sync. Input Current	I_{SYNC}	-	4(s)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 4,10,12) = GND V_{IN} (Pin 13) = 10V +V_{IN} (Pin 15) = 20V C = 100nF R = 3.6kΩ V_{IN} (Pin 3) = 3.5V (Pin 3)	0.4	2.5	mA
34	Voltage Stability	V_{STAB}	-	4(t)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 8.0 to 35V C = 10nF R = 3.6kΩ (Pin 4)	−1.0	1.0	%
35	Supply Current	I_{CC}	3005	4(u)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND +V_{IN} (Pin 15) = 35V C = 470pF (Pin 15)	-	20	mA

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - a.c. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
36	Minimum Frequency	f_{MIN}	-	4(v)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 100nF R = 200kΩ (Pin 4)	50	120	Hz
37	Maximum Frequency	f_{MAX}	-	4(v)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 470pF R = 2.0kΩ (Pin 4)	400	-	kHz
38	Clock Pulse Width	P_W	-	4(v)	V_{IN} (Pins 1,2,9) = 2.5V V_{IN} (Pins 3,10,12) = GND + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ (Pin 4)	0.3	1.4	µs
39	Minimum Duty Cycle A	MINDCA	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 0.7V (Pin 11)	-	0	%
40	Minimum Duty Cycle B	MINDCB	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 0.7V (Pin 14)	-	0	%
41	Maximum Duty Cycle A	MAXDCA	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 3.6V (Pin 11)	45	50	%

NOTES: See Page 21.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C AND −55°C - a.c. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
42	Maximum Duty Cycle B	MAXDCB	-	4(w)	V_{IN} (Pins 1,2) = 2.5V V_{IN} (Pins 3,10,12) = GND V_{IN} (Pin 13) = 10V + V_{IN} (Pin 15) = 20V C = 10nF R = 3.6kΩ V_{IN} (Pin 9) = 3.6V (Pin 14)	45	50	%

NOTES: See Page 21.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

FIGURE 4(a) - REFERENCE OUTPUT VOLTAGE, LINE REGULATION VOLTAGE, LOAD REGULATION VOLTAGE AND SHORT CIRCUIT CURRENT

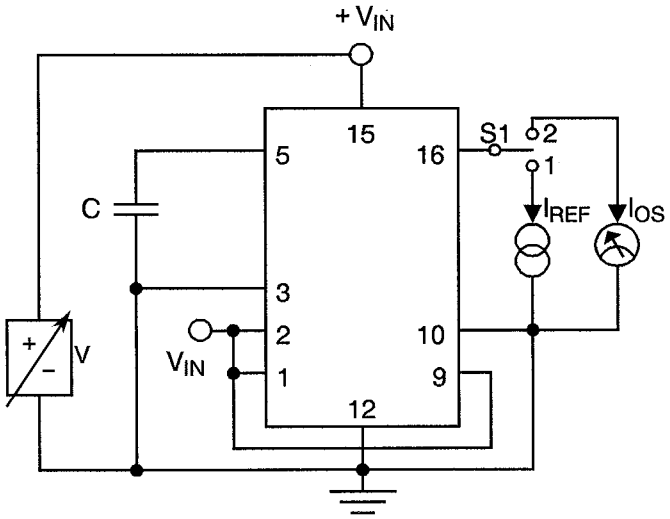
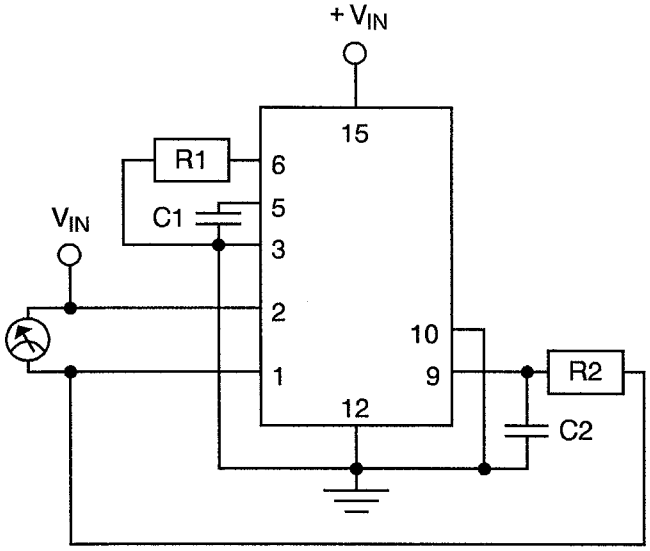


FIGURE 4(b) - INPUT OFFSET VOLTAGE



NOTES

1. S1 is in Position 1 for V_{REF}, K_{line} and K_{load} measurements.
2. S1 is in Position 2 for I_{OS} measurement.

FIGURE 4(c) - INPUT (MINUS) BIAS CURRENT

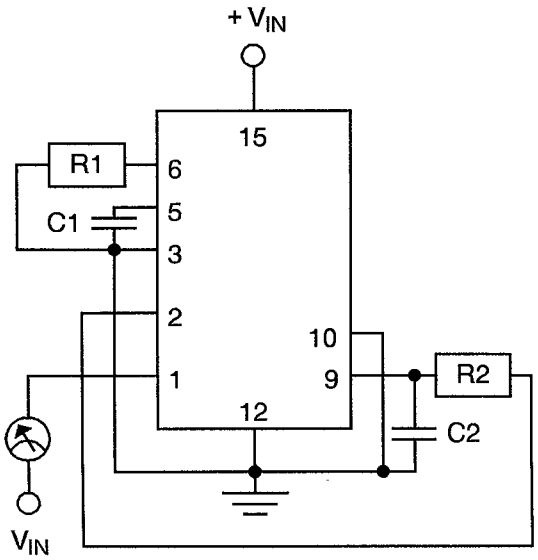


FIGURE 4(d) - INPUT (PLUS) BIAS CURRENT

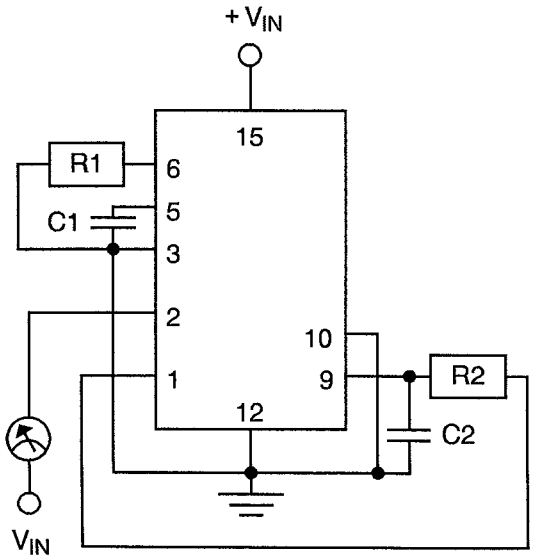
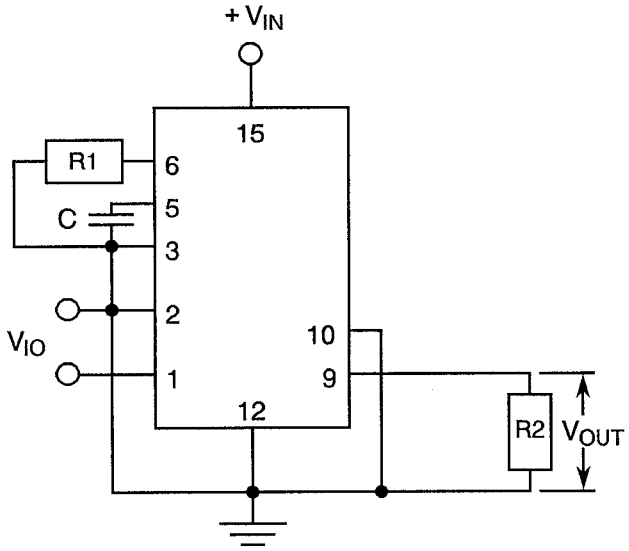


FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(e) - DC OPEN LOOP VOLTAGE GAIN



NOTES

1. $A_{VS} = 20 \text{ Log } \frac{V_{OUT}}{V_{IN}} = 20 \text{ Log } \left(\frac{\Delta V_{OUT}}{\Delta V_{IO}} \right)$.

   V_{IO} = Offset.

FIGURE 4(f) - OUTPUT VOLTAGE LOW LEVEL AND HIGH LEVEL

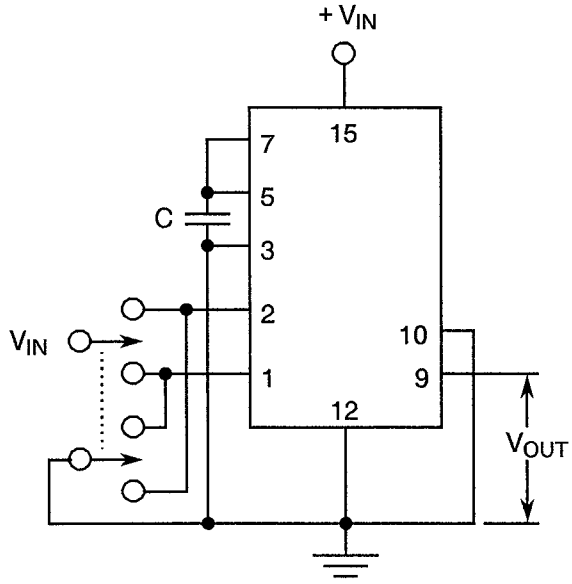
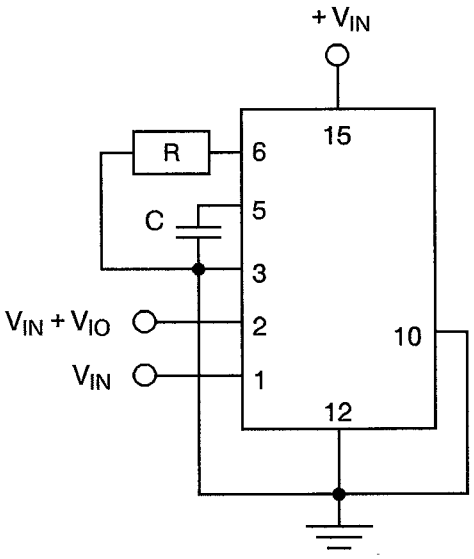


FIGURE 4(g) - COMMON MODE REJECTION RATIO

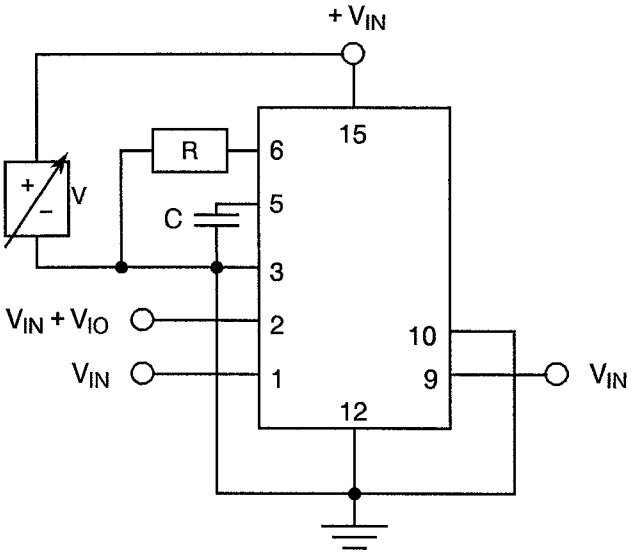


NOTES

1. $\text{CMRR} = 20 \text{ Log } \left(\frac{\Delta V_{OUT}}{\Delta V_{IO}} \right)$.

   V_{IO} = Offset.

FIGURE 4(h) - POWER SUPPLY REJECTION RATIO



NOTES

1. $\text{PSRR} = 20 \text{ Log } \left(\frac{\Delta V_{OUT}}{\Delta V_{IO}} \right)$.

   V_{IO} = Offset.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(i) - INPUT THRESHOLD MAX. AND ZERO DUTY CYCLE

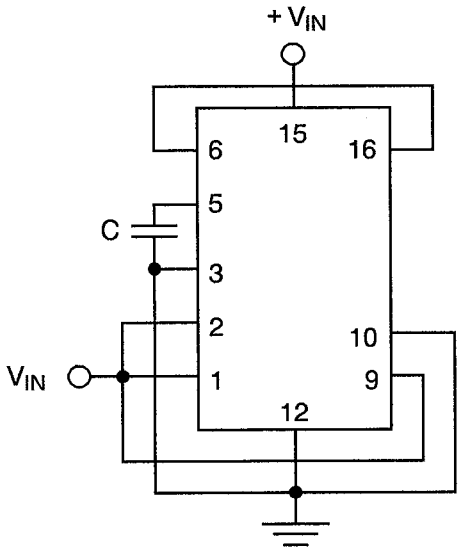


FIGURE 4(j) - SOFTSTART CURRENT

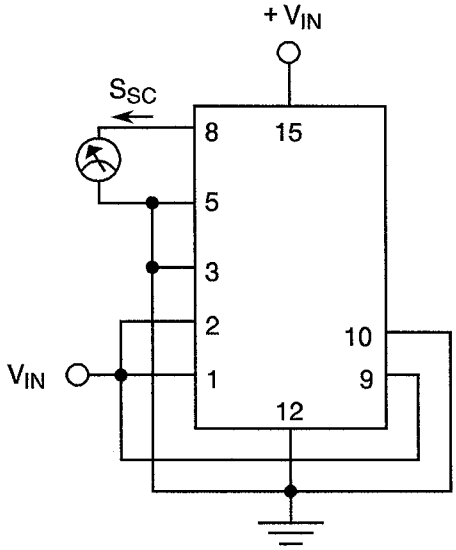


FIGURE 4(k) - SOFTSTART LOW LEVEL AND SHUTDOWN INPUT CURRENT

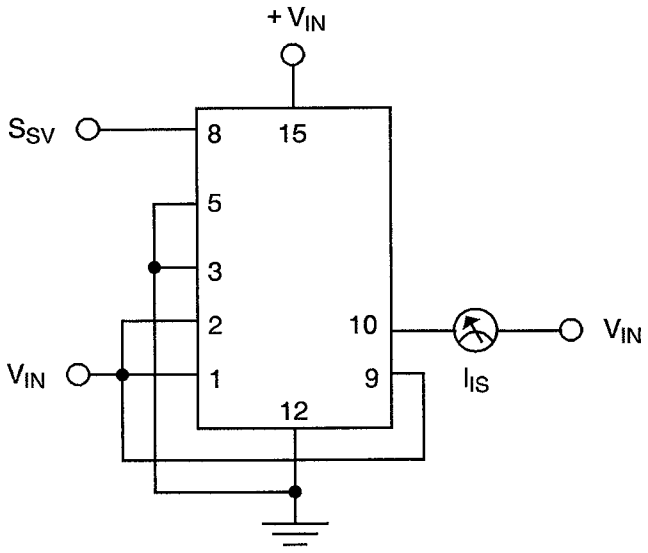


FIGURE 4(l) - SHUTDOWN THRESHOLD

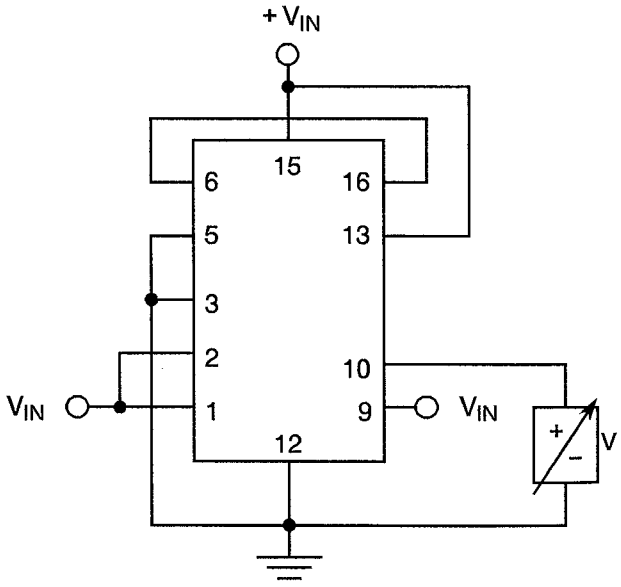


FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(m) - OUTPUT VOLTAGE LOW LEVEL A AND B

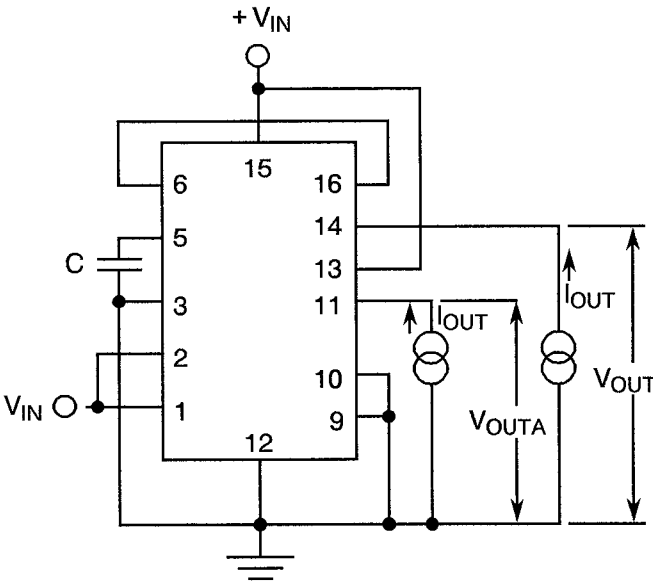


FIGURE 4(n) - OUTPUT VOLTAGE HIGH LEVEL A AND B

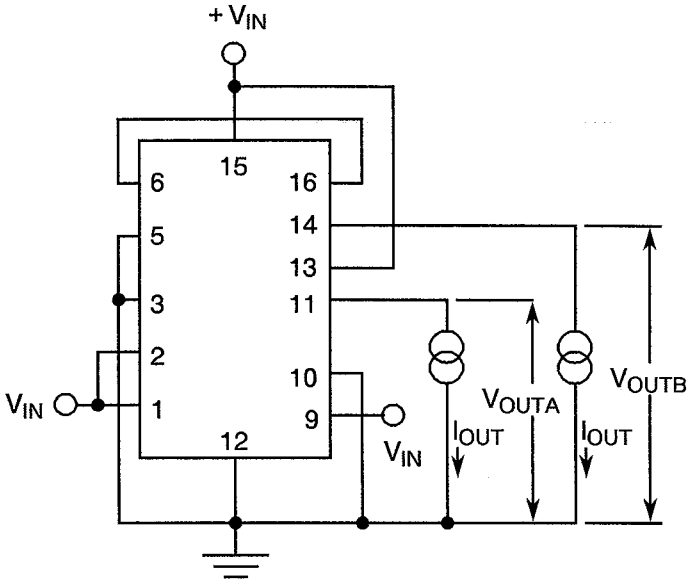


FIGURE 4(o) - UNDER-VOLTAGE LOCKOUT

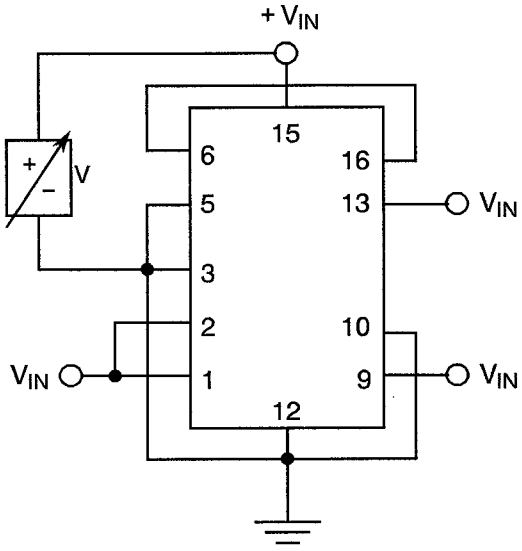


FIGURE 4(p) - COLLECTOR LEAKAGE CURRENT

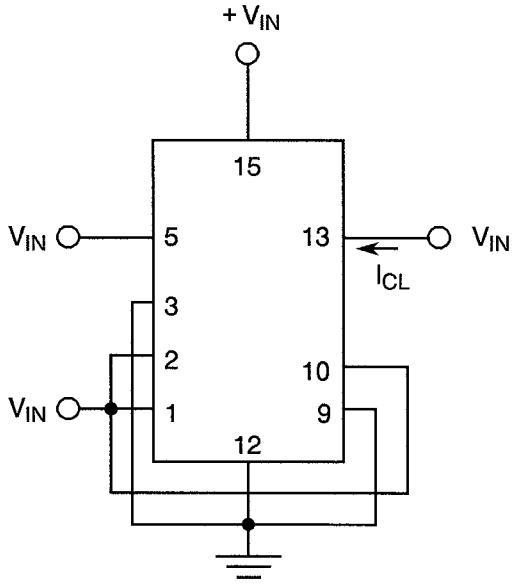


FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(q) - CURRENT MIRROR

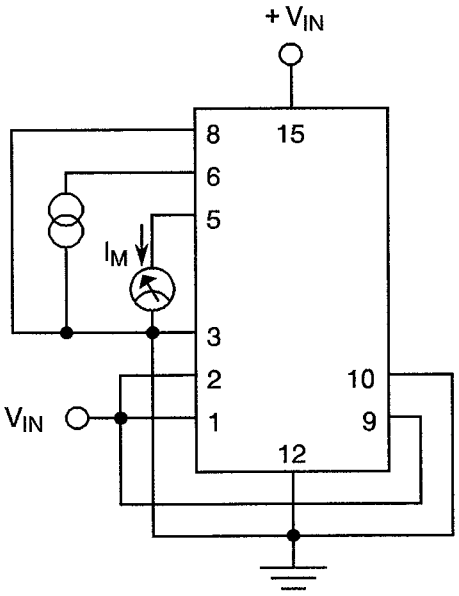


FIGURE 4(r) - SYNC THRESHOLD

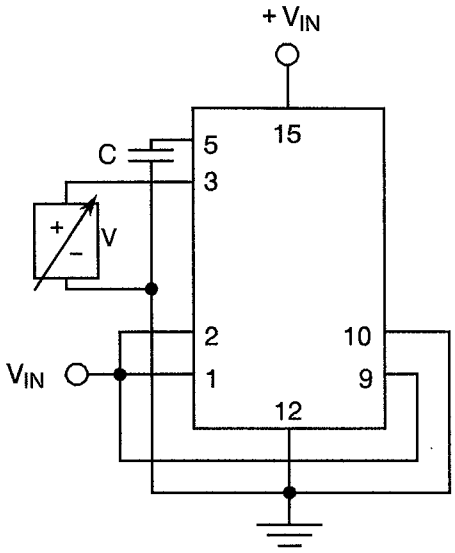


FIGURE 4(s) - SYNC INPUT CURRENT

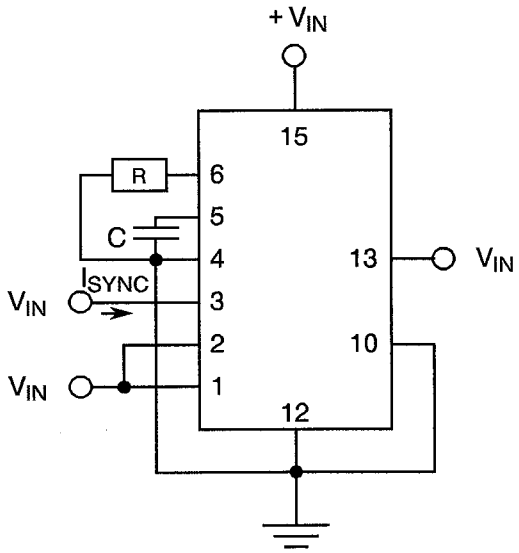


FIGURE 4(t) - VOLTAGE STABILITY

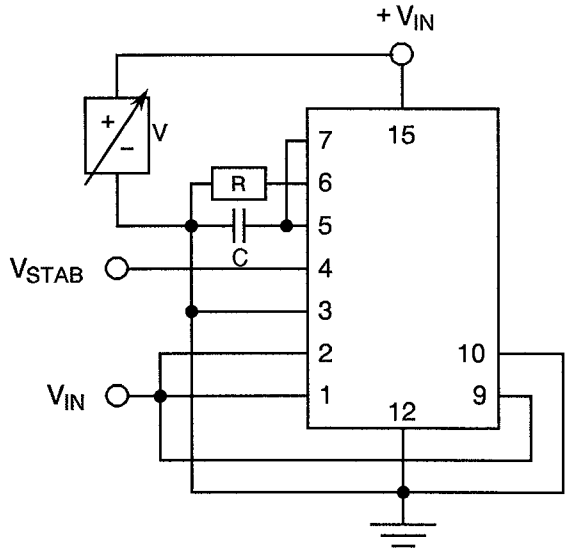


FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(u) - SUPPLY CURRENT

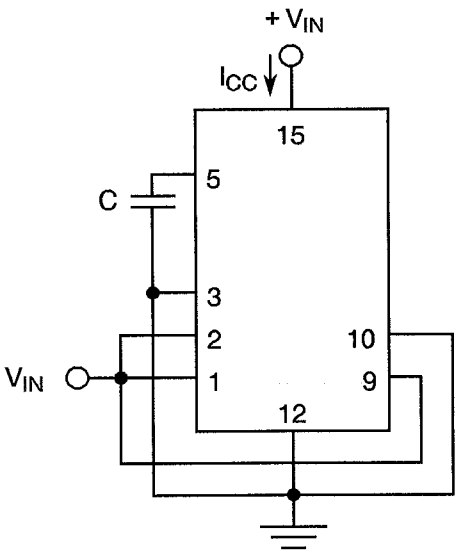


FIGURE 4(v) - MINIMUM AND MAXIMUM FREQUENCY AND CLOCK PULSE WIDTH

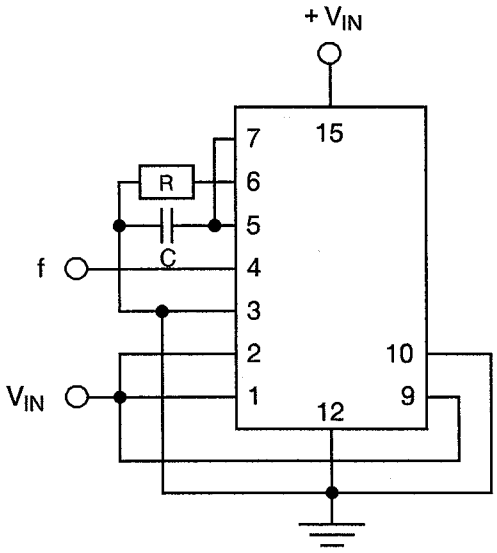


FIGURE 4(w) - DUTY CYCLE

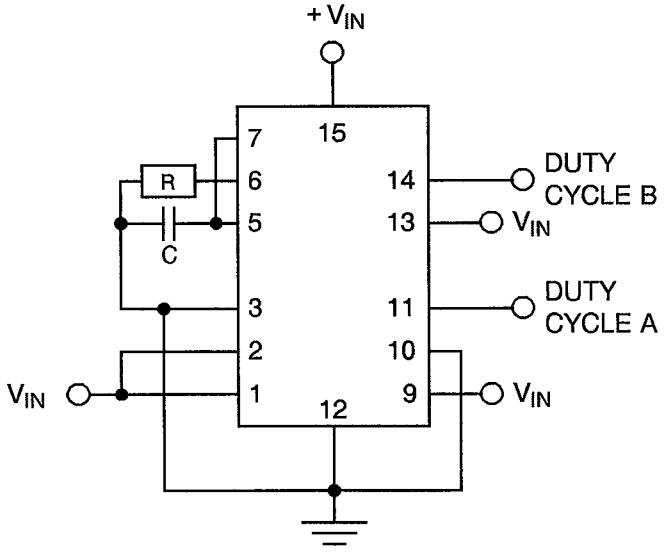


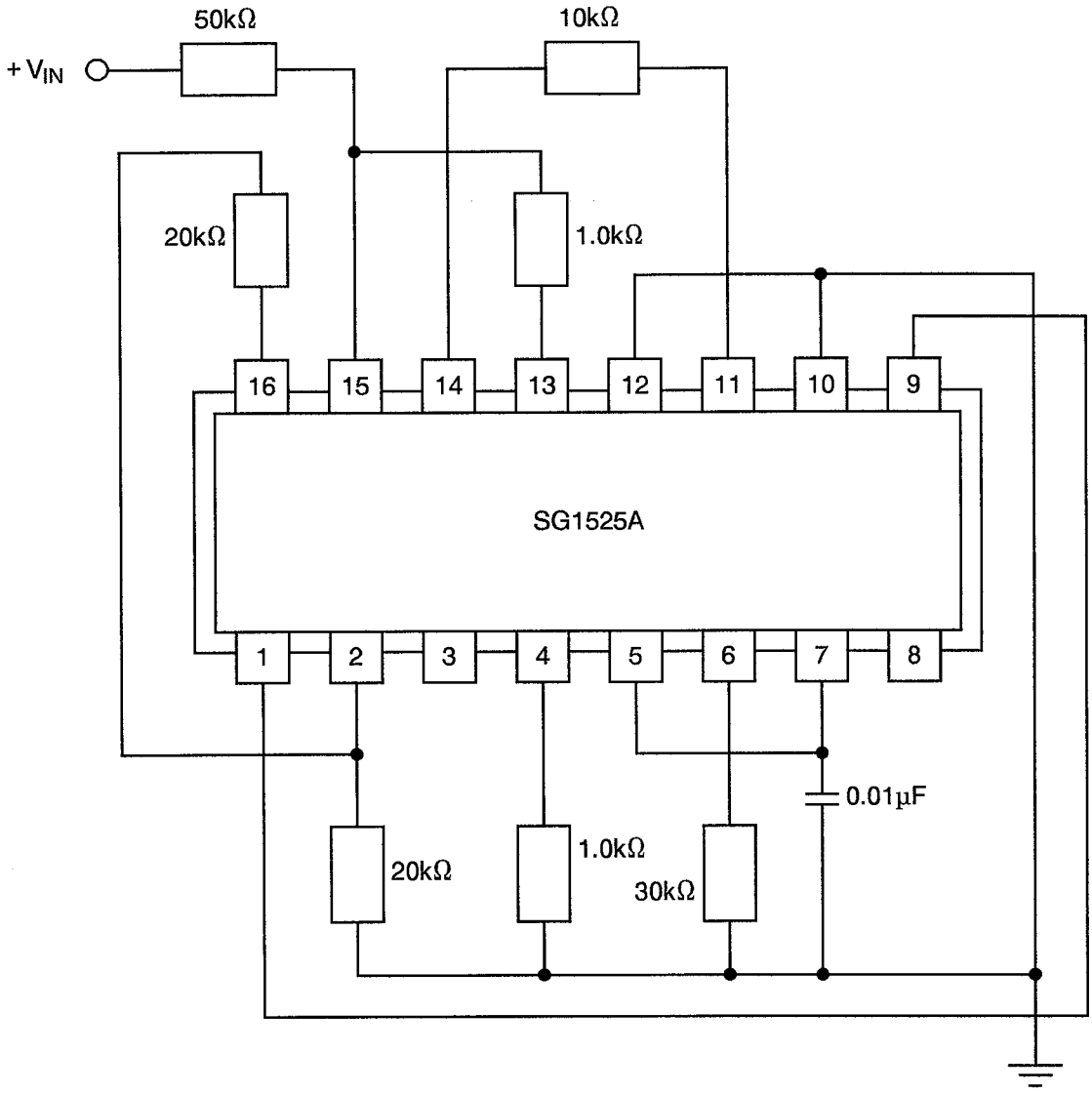
TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
1	Reference Output Voltage	V_{REF}	As per Table 2	As per Table 2	±35	mV
2	Line Regulation Voltage	K_{line}	As per Table 2	As per Table 2	±2.0	mV
3	Load Regulation Voltage	K_{load}	As per Table 2	As per Table 2	±5.0	mV
5	Input Offset Voltage	V_{IO}	As per Table 2	As per Table 2	±0.5	mV
6	Input (Minus) Bias Current	I_{-IB}	As per Table 2	As per Table 2	±50	nA
7	Input (Plus) Bias Current	I_{+IB}	As per Table 2	As per Table 2	±50	nA
8	Input Offset Current	I_{IO}	As per Table 2	As per Table 2	±50	nA
22	Output Voltage Low Level A2	V_{OLA2}	As per Table 2	As per Table 2	±200	mV
24	Output Voltage Low Level B2	V_{OLB2}	As per Table 2	As per Table 2	±200	mV
26	Output Voltage High Level A2	V_{OHA2}	As per Table 2	As per Table 2	±5.0	%
28	Output Voltage High Level B2	V_{OHB2}	As per Table 2	As per Table 2	±5.0	%
35	Supply Current	I_{CC}	As per Table 2	As per Table 2	±1.0	mA

TABLE 5 - CONDITIONS FOR POWER BURN-IN AND OPERATING LIFE TESTS

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+125(+0−5)	°C
2	Positive Supply Voltage (Pin 15)	$+V_{IN}$	32	V
3	Negative Supply Voltage (Pin 12)	GND	0	V

FIGURE 5 - ELECTRICAL CIRCUIT FOR POWER BURN-IN AND OPERATING LIFE TESTS



4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 9000)

4.8.1 Electrical Measurements on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +25 \pm 3$ °C.

4.8.2 Electrical Measurements at Intermediate Points during Endurance Tests

The parameters to be measured at intermediate points during endurance tests are as scheduled in Table 6 of this specification. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +25 \pm 5$ °C.

4.8.3 Electrical Measurements on Completion of Endurance Tests

The parameters to be measured on completion of endurance testing are as scheduled in Table 6 of this specification. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +25 \pm 5$ °C.

4.8.4 Conditions for Operating Life Test (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 9000. The conditions for operating life testing shall be as specified in Table 5 of this specification.

4.8.5 Electrical Circuits for Operating Life Tests

Circuits for use in performing the operating life test are shown in Figure 5 of this specification.

4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 9000. The conditions for high temperature storage shall be $T_{amb} = +150(+0\text{-}5)$ °C.

4.9 TOTAL DOSE IRRADIATION TESTING

Not applicable.

TABLE 6 - ELECTRICAL MEASUREMENTS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTS

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	CHANGE LIMIT (Δ)	ABSOLUTE		UNIT
						MIN	MAX	
1	Reference Output Voltage	V_{REF}	As per Table 2	As per Table 2	±0.035	5.05	5.15	V
2	Line Regulation Voltage	K_{line}	As per Table 2	As per Table 2	±2.0	-	20	mV
3	Load Regulation Voltage	K_{load}	As per Table 2	As per Table 2	±5.0	−50	-	mV
5	Input Offset Voltage	V_{IO}	As per Table 2	As per Table 2	±0.5	−5.0	5.0	mV
6	Input (Minus) Bias Current	I_{-IB}	As per Table 2	As per Table 2	±0.05	-	10	µA
7	Input (Plus) Bias Current	I_{+IB}	As per Table 2	As per Table 2	±0.05	-	10	µA
8	Input Offset Current	I_{IO}	As per Table 2	As per Table 2	±0.05	−1.0	1.0	µA
22	Output Voltage Low Level A2	V_{OLA2}	As per Table 2	As per Table 2	±0.2	-	2.0	V
24	Output Voltage Low Level B2	V_{OLB2}	As per Table 2	As per Table 2	±0.2	-	2.0	V
26	Output Voltage High Level A2	V_{OHA2}	As per Table 2	As per Table 2	±5.0%	17	-	V
28	Output Voltage High Level B2	V_{OHB2}	As per Table 2	As per Table 2	±5.0%	17	-	V
35	Supply Current	I_{CC}	As per Table 2	As per Table 2	±1.0	-	20	mA