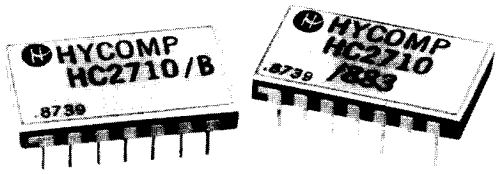
HyComp, Inc.



HC2710
HC2711
HC2712

+10V, −10V, and ±10V Ultra Stable Voltage References

FEATURES

- **Improved Drop-in Replacements for AD2710 Series**
- **Initial Accuracy to Better Than 1.0 mV**
- **Tempcos to 1 ppm/°C**
- **Short Circuit Protected**
- **Standard 14 Pin Dual-in-Line Package**
- **Fully Compliant MIL-STD-883 Versions Available**

APPLICATIONS

- **High Accuracy D/A and A/D Converters**
- **High Resolution Servo Systems**
- **Precision Test and Measurement Systems**
- **Calibration Standards**

DESCRIPTION

The HC2710 Series are Ultra Stable Voltage References that use Thin Film Hybrid technology to achieve extremely accurate, low temperature coefficient, 10 volt reference sources.

Nichrome Thin Film resistors on ceramic provide excellent characteristics: low absolute and tracking temperature coefficients, trimmable to high accuracy and superior long term stability.

Key specifications for the HC2710 Series include: untrimmed initial accuracy to 1 mV (0.01%) maximum, drifts of 1.0 ppm/ °C maximum, over selected operating temperature range. Line and load regulation are 200 μV/V and 50 μV/mA maximum and long term stability is also excellent, typically 25 ppm for 1000 hours at 25 °C.

Three basic versions are available, the HC2710 for + 10 volt applications, the HC2711 for − 10 volt applications and the HC2712 for applications requiring both + 10 volt and − 10 volt sources which track over temperature.

The HC2710 Series is packaged in standard 14 pin Dual-in-Line packages and models are available fully compliant to MIL-STD-883 for military and aerospace applications.

Hybrid Solutions from **HyComp, Inc.**
165 Cedar Hill Street, Marlborough, Massachusetts 01752
Tel: (617) 485-6300 TWX: 710-347-0385 FAX: (617) 481-1547

ABSOLUTE MAXIMUM RATINGS

Storage Temperature	− 65 to + 150 °C
Operating Temperature	− 55 °C to + 125 °C
+ Vcc Supply Voltage	0 to + 20 Volts
− Vcc Supply Voltage	0 to − 20 Volts
Reference Outputs	Short Circuit Protected to GND.

HC2710 SERIES—SPECIFICATIONS (Minimum or Maximum @ V_{CC} = ± 15V, R_L = 2K, T_A = 25°C unless otherwise noted)

MODEL	HC271xJD	HC271xLD	HC271xSD	HC271xUD	UNITS
Specification Temperature	0 to + 70	0 to + 70	− 25 to + 85	− 55 to + 125	°C
OUTPUT VOLTAGE ERROR					
T_A = 25 °C					
HC2710 (+ 10.000V) Ei	± 0.0010	± 0.0010	± 0.0010	± 0.0010	V
HC2711 (− 10.000V) Ei	± 0.0010	± 0.0010	± 0.0010	± 0.0010	V
HC2712 (± 10.000V) Ei	± 0.0010	± 0.0010	± 0.0010	± 0.0010	V
T_{MIN} to T_{MAX} (Note 1)					
HC2710, HC2711	± 2.0	± 1.0	± 2.0	± 3.5	ppm/°C
HC2712 EΔ	(± .9)	(± .5)	(± 1.2)	(± 3.5)	mV
$ER_{MAX.}$	(± 1.9)	(± 1.5)	(± 2.2)	(± 4.5)	mV
OUTPUT CURRENT (Note 2)					
T_A = 25 °C					
HC2710	+ 10	+ 10	+ 10	+ 10	mA
HC2711	− 10	− 10	− 10	− 10	mA
HC2712	± 10	± 10	± 10	± 10	mA
T_{MIN} to T_{MAX}					
HC2710	+ 5	+ 5	+ 5	+ 5	mA
HC2711	− 5	− 5	− 5	− 5	mA
HC2712	± 5	± 5	± 5	± 5	mA
LINE REGULATION					
Vcc = ± 13.5V to Vcc = ± 16.5V	200	200	200	200	μV/V
LOAD REGULATION					
0 to ± 5 mA	50	50	50	50	μV/mA
OUTPUT RESISTANCE					
Typical	0.05	0.05	0.05	0.05	Ohms
SUPPLY REQUIREMENTS					
Vcc Range					
HC2710	+ 13 to + 18	+ 13 to + 18	+ 13 to + 18	+ 13 to + 18	V
HC2711	− 13 to − 18	− 13 to − 18	− 13 to − 18	− 13 to − 18	V
HC2712	± 13 to ± 18	± 13 to ± 18	± 13 to ± 18	± 13 to ± 18	V
ICC Quiescent					
HC2710	+ 9	+ 9	+ 9	+ 9	mA
HC2711	− 9	− 9	− 9	− 9	mA
HC2712	+ 9, − 3	+ 9, − 3	+ 9, − 3	+ 9, − 3	mA
NOISE					
0.1 to 10 Hz	30	30	30	30	μVp-p
OUTPUT STABILITY					
T_A 25 °C, 1000 hrs., Typical	25	25	25	25	ppm
OFFSET ADJUST					
Range	10mV	10mV	10mV	10mV	mV
Effect on Drift, Typical	± 0.3	± 0.3	± 0.3	± 0.3	ppm/°C/mV
AVAILABLE PACKAGES					
All Types	14 Pin Dual-in-Line Package				

Note 1:
Output voltage error as a function of temperature is specified using the box method. In this method each unit is tested at 25 °C, $T_{min.}$ and $T_{max.}$ At each test temperature the output voltage must fall within the limits of the shaded area in Figure 1. The allowable error is equal to the initial error at 25 °C, Ei, plus the drift error, EΔ at T_{min} and T_{max} from 25 °C.

These values are given in the specification table under output voltage error. Calculate Max. limits using:

$$ER_{MAX.} = Ei + E_{\Delta}$$

Note 2:
Specified with a 1K resistive load to common.

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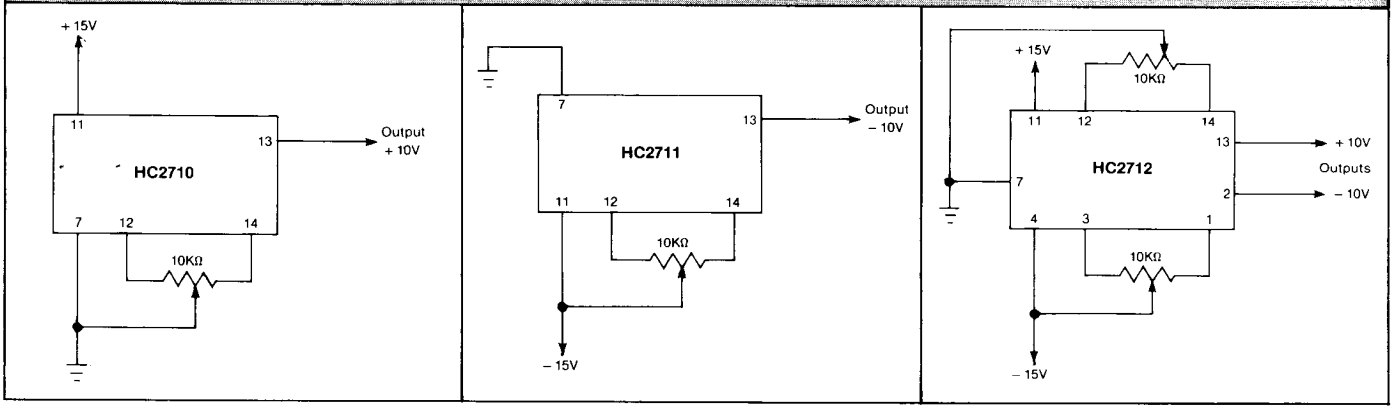
HC2710 SERIES—APPLICATIONS INFORMATION

Output Trim Connections



Pin Designations

HC2710 PIN	HC2710 DESIGNATION	HC2711 PIN	HC2711 DESIGNATION	HC2712 PIN	HC2712 DESIGNATION
1	N/C	1	N/C	1	−10V Adjust
2	N/C	2	N/C	2	−10V Output
3	N/C	3	N/C	3	−10V Adjust
4	N/C	4	N/C	4	−15V Supply
5	N/C	5	N/C	5	N/C
6	N/C	6	N/C	6	N/C
7	Ground	7	Ground	7	Ground
8	N/C	8	N/C	8	N/C
9	N/C	9	N/C	9	N/C
10	Test Point*	10	Test Point*	10	Test Point*
11	+15V Supply	11	−15V Supply	11	+15V Supply
12	+10V Adjust	12	−10V Adjust	12	+10V Adjust
13	+10V Output	13	−10V Output	13	+10V Output
14	+10V Adjust	14	−10V Adjust	14	+10V Adjust

*Pins labeled test point are used in the initial calibration of the HC2710 Series. Connection to these pins may cause accuracy errors and possible damage to the units.

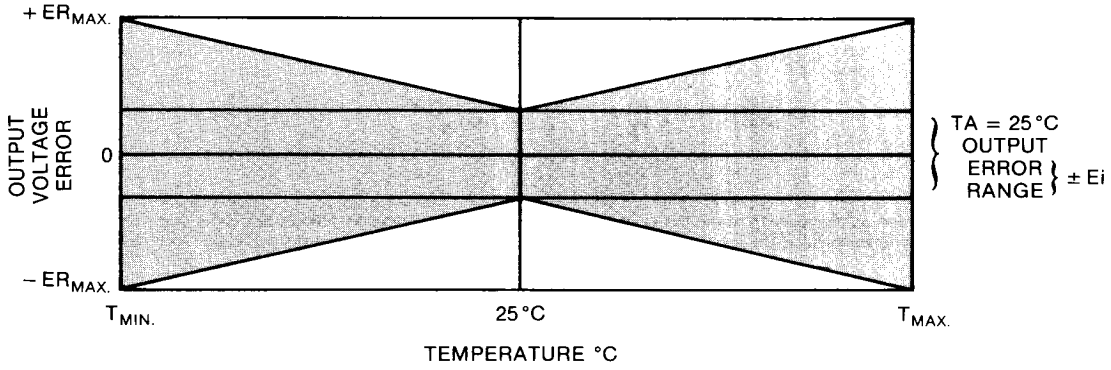


Figure 1. Maximum change from ± 10V output from $T_{MIN.}$ to $T_{MAX.}$

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ORDERING INFORMATION

HC 271 X X D/X

HyComp Designator	HyComp P/N	Output Voltage	Temperature Range/Grade	Package	Screening
		0 - + 10V	J — 0°C to +70°C	D-Dual-in-Line	- Commercial
		1 - − 10V	L — 0°C to +70°C, Best		B- HyComp Internal High Reliability (Not Compliant)
		2 - ± 10V	S — −25°C to +85°C		883- MIL-STD-883 (Fully Compliant)
			U — −55°C to +125°C, Best		

HIGH RELIABILITY SCREENING

HyComp offers the HC2710 Series in three reliability grades; Commercial for normal commercial and industrial applications, Screened to HyComp's internal high reliability screening procedures for medical, critical industrial, and non-critical Federal Military applications, and fully compliant to MIL-M-38510 and MIL-STD-883 for normal military and aerospace applications. Details of HyComp's internal high reliability screening procedures are shown in the table on the right, copies of MIL-M-38510 and MIL-STD-883 can be obtained from:

Naval Publications and Forms Center
Code 3015
5801 Tabor Avenue
Philadelphia, PA 19120

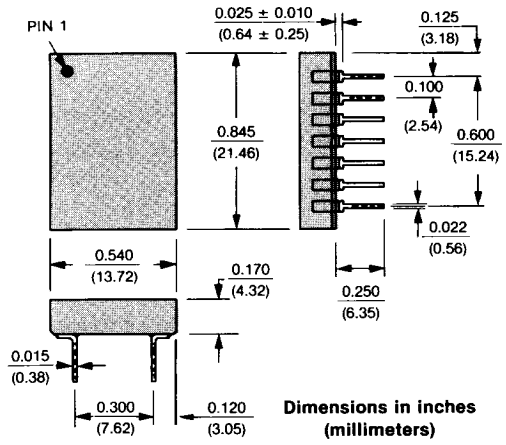
HyComp's Internal High Reliability Screening *

Test/Inspection	MIL-STD-883 Method	MIL-STD-883 Condition	Sample Size
Internal Visual	2017	B	100%
Stabilization Bake	1008	C	100%
Temperature Cycle	1010	C	100%
Constant Acceleration (Y1)	2001	A	100%
Fine Leak	1014	A1	100%
Gross Leak	1014	C1	100%
Electrical Test			Optional
Burn-in (125 °C)	1015		100%
Electrical Test			100%
Final Visual	2009		100%

* Parts screened to this procedure are not compliant to MIL-STD-883.

PACKAGE

14 PIN DIP



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