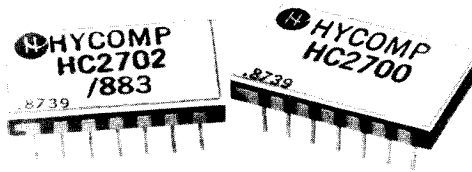




**HyComp, Inc.**



**HC2700  
HC2701  
HC2702**

## **+ 10V, - 10V, and $\pm 10V$ Precision Voltage References**

### **FEATURES**

- Drop-in Replacements for AD2700 Series
- Initial Accuracy to Better Than 2.5 mV
- Tempcos to Better Than 3 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 HC2700 Series are Precision 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 HC2700 Series include: untrimmed initial accuracy to 2.5 mV (0.025%) maximum, drifts over temperature to 3 ppm/°C maximum, and  $\pm 5$  mA drive minimum over the full operating temperature range. Line and load regulation are 300  $\mu$ V/V and 50  $\mu$ V/mA maximum and long term stability is also excellent, typically 100 ppm for 1000 hours at 25°C.

The HC2700 Series includes internal power supply filter capacitors to insure continuous low noise operation.

Three basic versions are available, the HC2700 for + 10 volt applications, the HC2701 for - 10 volt applications and the HC2702 for applications requiring both + 10 volt and - 10 volt sources which track over temperature.

The HC2700 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**

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# 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.

## HC2700 SERIES—SPECIFICATIONS (Minimum or Maximum @ V<sub>CC</sub> = ± 15V, R<sub>L</sub> = 2K, T<sub>A</sub> = 25°C unless otherwise noted)

MODEL	HC270xJD	HC270xLD	HC270xSD	HC270xUD	UNITS
Specification Temperature	– 25 to + 85	– 25 to + 85	– 55 to + 125	– 55 to + 125	°C
<b>OUTPUT VOLTAGE ERROR</b>					
T <sub>A</sub> = 25 °C					
HC2700 (+ 10.000V)	± 0.0050	± 0.0025	± 0.0050	± 0.0025	V
HC2701 (– 10.000V)	± 0.0050	± 0.0025	± 0.0050	± 0.0025	V
HC2702 (± 10.000V)	± 0.0050	± 0.0025	± 0.0050	± 0.0025	V
T <sub>MIN</sub> to T <sub>MAX</sub> (Note 1)					
HC2700, HC2701	± 10.0 (± 6.0)	± 3.0 (± 1.8)	± 3.0 (± 3.0)	± 3.0 (± 3.0)	ppm/°C
ER <sub>MAX.</sub>	(± 11.0)	(± 4.3)	(± 8.0)	(± 5.5)	mV
HC2702	± 10.0 (± 6.0)	± 5.0 (± 3.0)	± 5 (± 5.0)	± 3.0 (± 3.0)	ppm/°C
ER <sub>MAX.</sub>	(± 11.0)	(± 5.5)	(± 10.0)	(± 5.5)	mV
<b>OUTPUT CURRENT (Note 2)</b>					
T <sub>A</sub> = 25 °C					
HC2700	+ 10	+ 10	+ 10	+ 10	mA
HC2701	– 10	– 10	– 10	– 10	mA
HC2702	± 10	± 10	± 10	± 10	mA
T <sub>MIN</sub> to T <sub>MAX</sub>					
HC2700	+ 5	+ 5	+ 5	+ 5	mA
HC2701	– 5	– 5	– 5	– 5	mA
HC2702	± 5	± 5	± 5	± 5	mA
<b>LINE REGULATION</b>					
V <sub>CC</sub> = ± 13.5V to V <sub>CC</sub> = ± 16.5V	300	300	300	300	μV/V
<b>LOAD REGULATION</b>					
0 to ± 10 mA	50	50	50	50	μV/mA
<b>OUTPUT RESISTANCE</b>					
All Types	0.05	0.05	0.05	0.05	Ohms
<b>SUPPLY REQUIREMENTS</b>					
V <sub>CC</sub> Range					
HC2700	+ 13 to + 18	+ 13 to + 18	+ 13 to + 18	+ 13 to + 18	V
HC2701	– 13 to – 18	– 13 to – 18	– 13 to – 18	– 13 to – 18	V
HC2702	± 13 to ± 18	± 13 to ± 18	± 13 to ± 18	± 13 to ± 18	V
ICC Quiescent					
HC2700	+ 9	+ 9	+ 9	+ 9	mA
HC2701	– 9	– 9	– 9	– 9	mA
HC2702	+ 9, – 3	+ 9, – 3	+ 9, – 3	+ 9, – 3	mA
<b>NOISE</b>					
0.1 to 10 Hz	50	50	50	50	μVp-p
<b>OUTPUT STABILITY</b>					
T <sub>A</sub> 25 °C, 1000 hrs., Typical	100	100	100	100	ppm
<b>OFFSET ADJUST</b>					
Range	± 20	± 20	± 20	± 20	mV
Effect on Drift	± 4	± 4	± 4	± 4	μV/°C/mV
<b>AVAILABLE PACKAGES</b>					
All Types	14 Pin Dual-in-Line Package, 28 Pin Leadless Chip Carrier				

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<sub>min</sub>, and T<sub>max</sub>. 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<sub>min</sub> and T<sub>max</sub> from 25 °C.

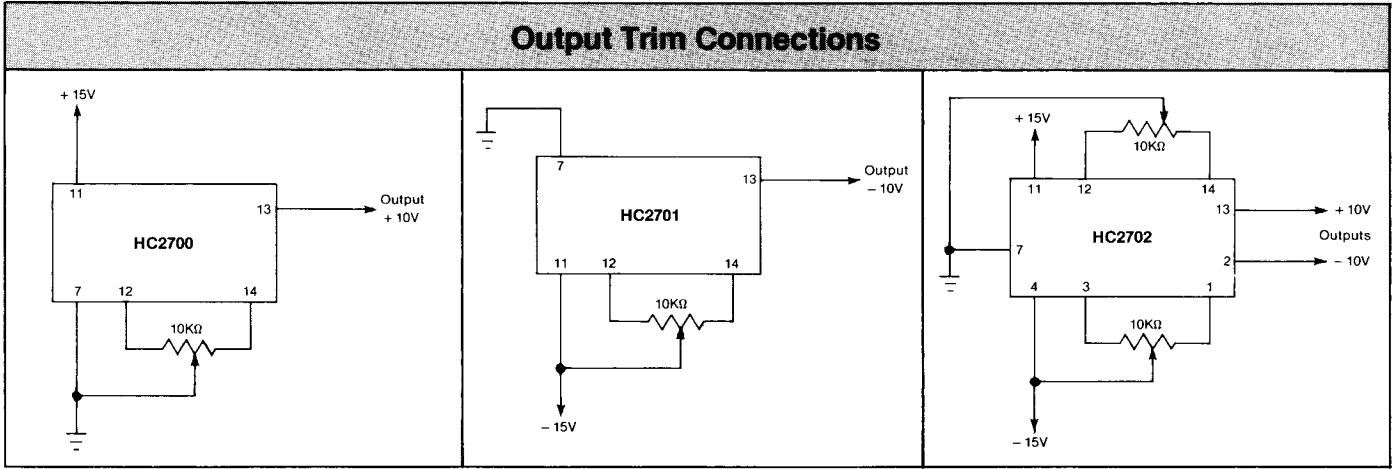
These values are given in the specification table under output voltage error. Calculate Max. limits using:

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

Note 2:

Specified with a 1K resistive load to common.

HC2700 SERIES—APPLICATIONS INFORMATION



Pin Designations					
HC2700		HC2701		HC2702	
PIN	DESIGNATION	PIN	DESIGNATION	PIN	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 HC2700 Series. Connection to these pins may cause accuracy errors and possible damage to the units.

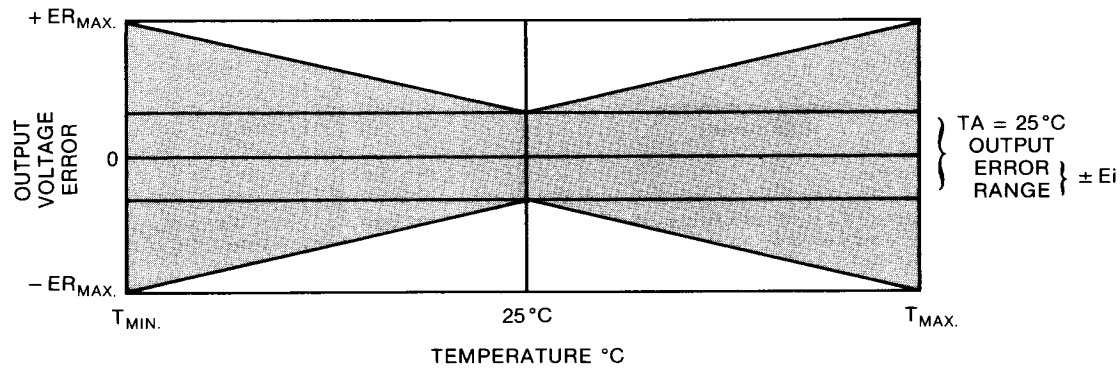
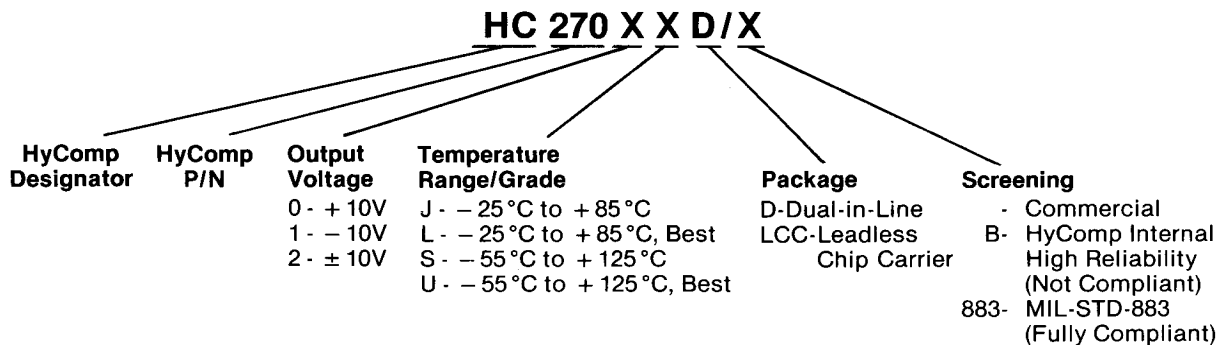


Figure 1. Maximum change from  $\pm 10\text{V}$  output from  $T_{\text{MIN}}$  to  $T_{\text{MAX}}$ .

# ORDERING INFORMATION



## HIGH RELIABILITY SCREENING

HyComp offers the HC2700 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

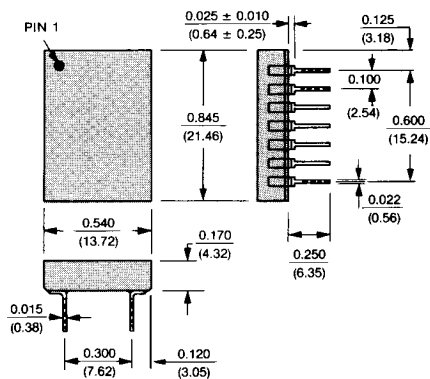
## HyComp's Internal High Reliability Screening \*

Test/Inspection	MIL-STD-883		Sample Size
	Method	Condition	
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.

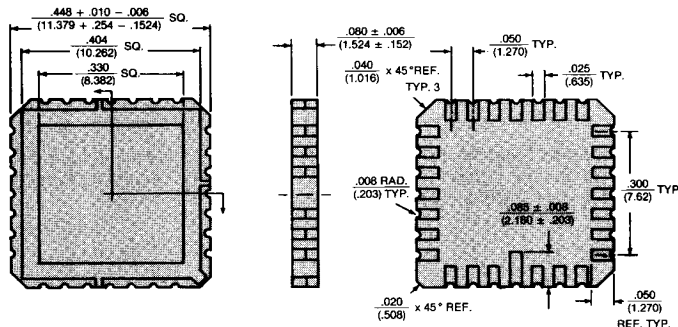
## PACKAGES

### 14 PIN DIP



Dimensions in inches  
(millimeters)

### 28 PIN LCC



HyComp, Inc. reserves the right to make improvements and/or change the specifications to their products at any time, and cannot assume responsibility for circuits shown, or represent that they are free from patent infringement.



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