

**PRECISION +10V,  
 -10V, ±10V REFERENCES**

**FEATURES**

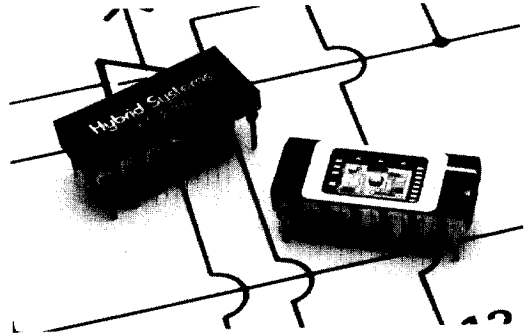
- High accuracy: 10.000 volts, ±2.5mV
- Low temperature coefficient: 3 ppm/°C
- 14-pin ceramic side brazed package
- Performance guaranteed -55°C to +125°C
- AD2700 Series pin out compatibility

MODEL	OUTPUT
HS2700	+10.000V
HS2701	-10.000V
HS2702	±10.000V

**DESCRIPTION**

The HS2700 Series offers a complete line of precision +10V, -10V, and ±10V references. All models can be processed to MIL-STD-883C or commercial/industrial standards. The HS2700 Series combines precision laser trimmed nichrome resistors with premium grade gain and reference components for ultra-stable overall performance. Versions with tempcos as low as ±3 ppm/°C are available.

The HS2700 is a +10 volt reference with 10mA output drive capability making it suitable for use with high accuracy bipolar D/A converters or as a general positive system reference.

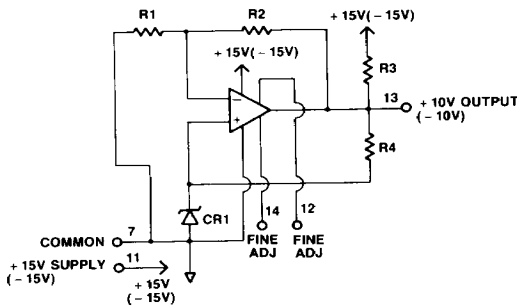


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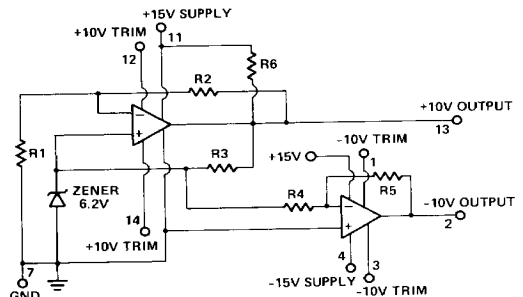
The HS2701 is a negative 10 volt reference designed to interface with CMOS D/A and A/D converters. For systems requiring a dual tracking reference, the HS2702 offers both positive and negative precision 10 volt outputs in a single package. Both are often used with the HS5210 Series 12-Bit A/D converters which require -10V external references for high accuracy over a wide temperature range.

Commercial "J" and "L" grades offer -25°C to +85°C operation while "S" and "U" grades operate from -55°C to +125°C. Screening to MIL-STD-883C is available.

**FUNCTIONAL DIAGRAMS**



**HS2700 (2701)**



**HS2702**

## SPECIFICATIONS

(Maximum or minimum @ $E_{IN} \pm 15V$  @ +25°C,  $R_L = 2k\Omega$  unless otherwise noted.)

MODEL	HS 2700JD	HS 2700LD	HS 2700SD	HS 2700UD
<b>ABSOLUTE MAX RATINGS</b>				
Input Voltage (for applicable supply)	$\pm 20V$	*	*	*
Power Dissipation @ +25°C				
HS 2700, 01	300mW	*	*	*
HS 2702	450mW	*	*	*
Operating Temperature Range	-25°C to +85°C	*	-55°C to +125°C	***
Storage Temperature Range	-65°C to +150°C	*	*	*
Lead Temperature (soldering, 10s)	+300°C	*	*	*
Short Circuit Protection (to GND)	Continuous	*	*	*
<b>OUTPUT VOLTAGE ERROR @ +25°C</b>				
HS 2700 (10.000V)	$\pm 0.005V$	$\pm 0.0025V$	*	**
HS 2701 (-10.000V)	$\pm 0.005V$	$\pm 0.0025V$	*	**
HS 2702 ( $\pm 10.000V$ )	$\pm 0.005V$	$\pm 0.0025V$	*	**
<b>OUTPUT CURRENT<sup>1</sup></b>				
@ +25°C	$\pm 10mA$	*	*	*
( $V_{IN} = \pm 13$ to $\pm 18V$ ) over op. temp. range	$\pm 5mA$	+5mA, -2mA	**	**
<b>OUTPUT VOLTAGE ERROR (<math>T_{min}</math> to <math>T_{max}</math>)<sup>2</sup></b>				
HS 2700, 01	10ppm/°C $\pm 11.0mV$	3ppm/°C $\pm 4.3mV$	** $\pm 8mV$	** $\pm 5.5mV$
HS 2702	10ppm/°C $\pm 11.0mV$	5ppm/°C $\pm 5.5mV$	** $\pm 10.0mV$	3ppm/°C $\pm 5.5mV$
<b>LINE REGULATION</b>				
$V_{IN} = \pm 13.5$ to $\pm 16.5V$	300 $\mu V/V$	*	*	*
<b>LOAD REGULATION</b>				
0 to +10mA				
HS 2700	50 $\mu V/mA$	*	*	*
HS 2701	200 $\mu V/mA$	*	*	*
HS 2702	50 $\mu V/mA$	*	*	*
<b>OUTPUT RESISTANCE</b>	0.05 $\Omega$	*	*	*
<b>INPUT VOLTAGE, OPERATING</b>				
	$\pm 13V$ to $\pm 18V$	*	*	*
<b>QUIESCENT CURRENT</b>				
HS 2700, 01	$\pm 14mA$	*	*	*
HS 2702	+17mA, -4mA	*	*	*
<b>NOISE</b>				
(0.1 to 10Hz)	50 $\mu V$ p-p typ	*	*	*
<b>OFFSET ADJUST RANGE</b>				
(See Diagrams)	$\pm 20mV$ min	*	*	*
<b>OFFSET ADJUST TEMP DRIFT EFFECT</b>				
	$\pm 4\mu V/°C$ per mV of Adjust typ	*	*	*
<b>PACKAGE</b>				
	14-Pin Ceramic DIP			

### NOTES:

\* Same as JD grade performance \*\* Same as LD grade performance \*\*\* Same as SD grade performance

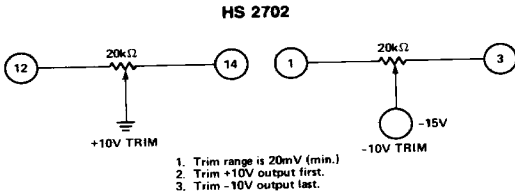
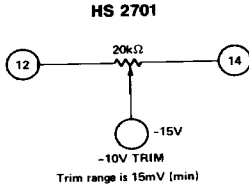
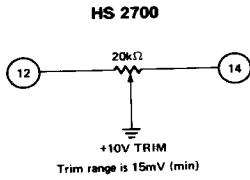
<sup>1</sup> Specified with resistive load to common

<sup>2</sup> Output voltage error as a function of temperature is determined using the box method. Each unit is tested at  $T_{min}$ ,  $T_{max}$  and +25°C. At each temperature  $V_{OUT}$  must fall within the rectangular area bounded by the minimum and maximum temperature and whose maximum  $V_{OUT}$  is equal to  $V_{OUT}$  nominal plus or minus the maximum +25°C error plus the maximum differential from +25°C. The box limits are noted below the drift values used to calculate the box.

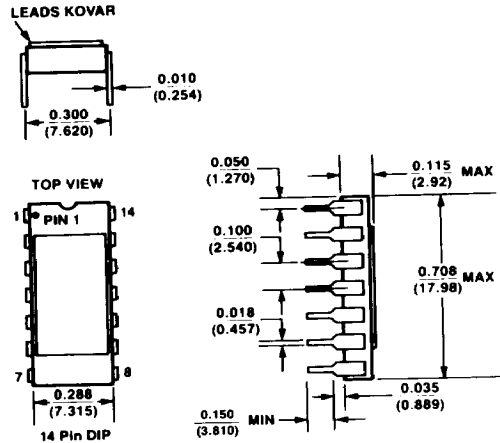
Specifications subject to change without notice

# APPLICATIONS INFORMATION

## OPTIONAL ADJUSTMENTS



# PACKAGE DIMENSIONS

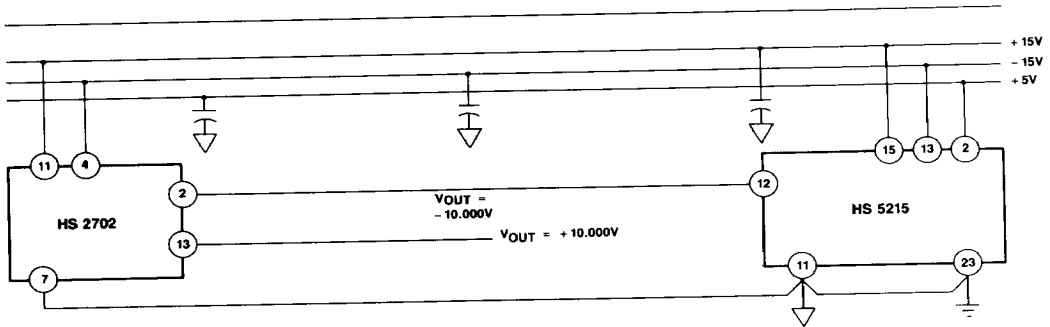


PIN OUT, HS 2702

1	-10V fine adj.
2	-10V OUT
3	-10V fine adj.
4	-15V
5	N/C
6	N/C
7	GND
8	N/C
9	N/C
10	T.P.
11	+15V
12	+10V fine adj.
13	+10V OUT
14	+10V fine adj.

PIN OUT, HS 2700, 2701

1	N/C
2	N/C
3	N/C
4	N/C
5	N/C
6	N/C
7	GND
8	N/C
9	N/C
10	N/C
11	+15V or (-15V)
12	V <sub>out</sub> fine adj.
13	V <sub>out</sub>
14	V <sub>out</sub> fine adj.



Using HS 2702 Reference with the Fast, High Accuracy HS 5215 - 12-Bit ADC

## ORDERING INFORMATION

MODEL	OUTPUT VOLTAGE ERROR	STABILITY	OPERATING TEMPERATURE RANGE	SCREENING
HS 2700JD	± 0.005V	10 ppm/°C	-25°C to +85°C	—
HS 2700LD	± 0.0025V	3 ppm/°C	-25°C to +85°C	—
HS 2700SD/883	± 0.005V	3 ppm/°C	-55°C to +125°C	MIL-STD-883C
HS 2700UD/883	± 0.0025V	3 ppm/°C	-55°C to +125°C	MIL-STD-883C
HS 2701JD	± 0.005V	10 ppm/°C	-25°C to +85°C	—
HS 2701LD	± 0.0025V	3 ppm/°C	-25°C to +85°C	—
HS 2701SD/883	± 0.005V	3 ppm/°C	-55°C to +125°C	MIL-STD-883C
HS 2701UD/883	± 0.0025V	3 ppm/°C	-55°C to +125°C	MIL-STD-883C
HS 2702JD	± 0.005V	10 ppm/°C	-25°C to +85°C	—
HS 2702LD	± 0.0025V	5 ppm/°C	-25°C to +85°C	—
HS 2702SD/883	± 0.005V	5 ppm/°C	-55°C to +125°C	MIL-STD-883C
HS 2700UD/883	± 0.0025V	3 ppm/°C	-55°C to +125°C	MIL-STD-883C