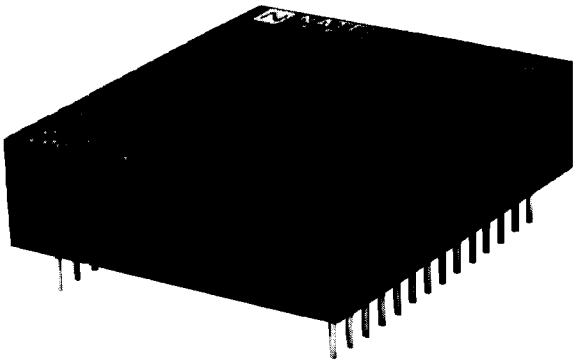
NATEL

Digital-to-Synchro(Resolver) Converter 16-Bit, Transformer Isolated

DSC5116/DRC5116

Features

- **Fully Protected 2 VA output**
  (current limiting)
  (short circuit proof)
  (thermal cutoff)
- **3 Arc-Minute Accuracy**
- **Does Not Require +5V Power Supply**
- **Very Low Scale Factor Variation**
  (0.05% maximum)
- **Reference and Signal Transformer Isolated**
- **TTL and CMOS Compatible**



Applications

Driving control transformers
Flight instrumentation
Fire control systems
Positioning control systems
Simulators
Driving CRT displays

DSC/DRC5116

Description

Model 5116, a 16-bit Digital-to-Synchro(Resolver) converter offers a low scale factor variation of 0.05%, high accuracy, and both Reference and Signal transformer isolation. The excellent features have been made possible by the use of proven and reliable Natel hybrid microcircuits as an integral part of the **5116**. Packaged in an industry standard size (3.1 X 2.6 X 0.82 inch), the converter requires only ±15V power supplies.

The logic interface is easy. All data bits (1-16) are true binary coded and are actively pulled down to ground, so if the application requires less than 16-bits any unused bits may be left unconnected. All digital inputs are TTL and 5V CMOS compatible, using internally derived logic thresholds that guarantee 0.8V as a logic "0" and 2.4V as a logic "1".

The power amplifier design incorporates a safe operating area protection circuit similar to those used in voltage regulators. Besides short-circuit protection and current limiting, the power amplifiers are designed to provide thermal shut down when the amplifier case temperature reaches 125°C, thereby making them virtually indestructible.

To make it possible to use this converter for existing sockets the Model 5114 is offered. Model 5114 is pin and size compatible with industry standard Digital-to-Synchro(Resolver) converters (e.g., Natel Models 5012 and 5112).

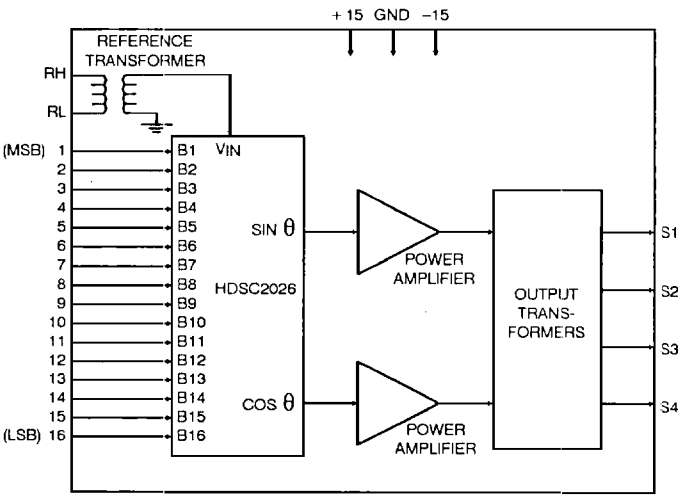


FIGURE 1 Block Diagram Model 5116

REVISION A. Replaces original data sheet.

Specifications

PARAMETER	VALUE	REMARKS
Digital Angular Resolution	16-bits (0.33 arc-seconds)	MSB = 180° LSB = 0.0055°
Output Accuracy		
Angular Accuracy Radius Accuracy Variation with load	±3.0 arc-minutes ±0.05% no load ±5.0 arc-minute/VA typical	Accuracy of the converter is maintained over specified frequency and operating temperature ranges.
Reference Input		Transformer Isolated
Voltages	26V-rms ±10% (Option 2) 115 V-rms ±10% (Option 5)	
Frequency	360 to 440 Hz, (Option 4) 54 to 440 Hz, (Option 6)	
Input Impedance	50KΩ 200 KΩ	26V-rms models 115 V-rms models
Breakdown Voltage	500 V minimum to ground	
Harmonic Distortion	10% maximum	Without degradation in accuracy.
Digital Inputs		Transient-protected CMOS
Logic "0" Level Logic "1" Level	−0.3 to 0.8 V-dc 2.4 to 5.5 V-dc	
Input Current Data Bits 1-16	15 μA typical (30 μA maximum), active pull down to ground.	Unused pins may be left unconnected.
Data Bit Coding	Positive logic, natural binary angle.	Bit 1 is MSB, Bit 16 is LSB.
Synchro (Resolver) Outputs		Transformer Isolated
Voltages	11.8 V-rms (Option 1) 26 V-rms (Option 2) 90 V-rms (Option 9)	For nominal reference voltages. The output varies directly in proportion to the reference voltage.
Drive Capability (L-L Balanced)	2 VA Load	
Output Settling Time	50 μsec maximum	For digital step change less than 45 degrees.
Phase Shift	Less than 2 (10) degrees	For 400 (60) Hz model with respect to reference.
Short Circuit Protection	Continuous, indefinite time	Without damaging or degrading the converter.
Thermal Cut-Off	At 125°C internal temperature	Output is automatically restored when temperature drops below 125°C
Load Regulation	8%/VA typical	For no-load to 2 VA load
Power Supplies		
Voltage Current No Load Full Load	±15 V-dc ±5% ±250 mA maximum ±450 mA maximum	 At power-up or step-changes over 45 degrees, supply current spikes will result.
Power Dissipation		Internal
No Load 2 VA Load	7.5 watts maximum 11.5 watts maximum	For resistive loads. Does not include power dissipated in the load.
Physical Characteristics		
Size	3.12 X 2.62 X 0.82 inches (80 X 67 X 21 mm)	

If your application requires non-standard input or output characteristics, please contact a Natel Applications Engineer or the Sales Department.

Pin Designations

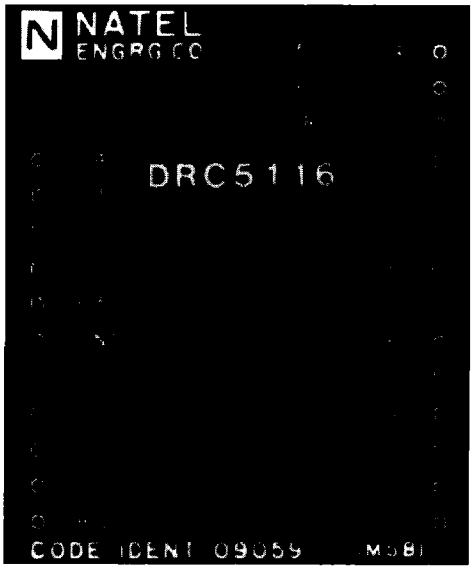


FIGURE 2 Model 5116 Pin Assignments

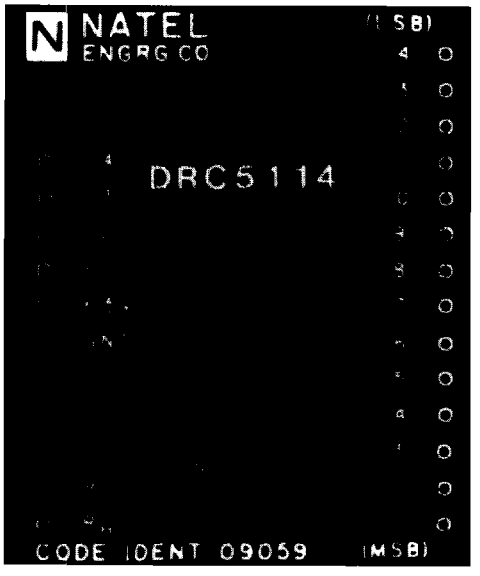


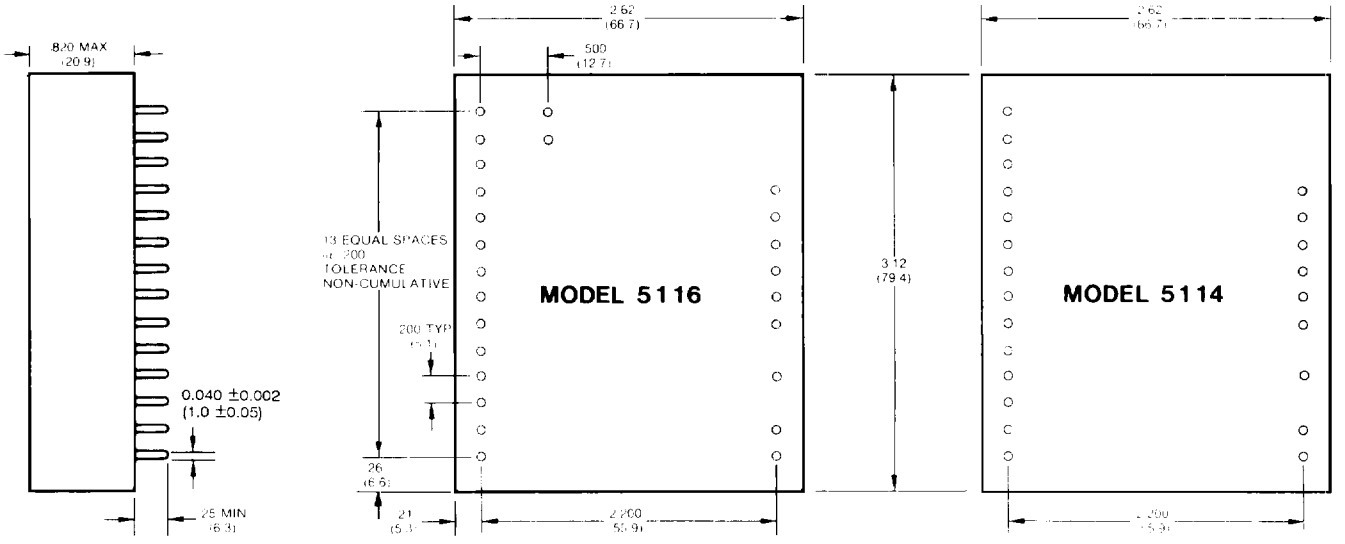
FIGURE 3 Model 5114 Pin Assignments

GND	Power Supply Ground Digital Ground
1-16	Parallel Input Data Bits - 1 is MSB. Bit weight = 180 degrees 16 is LSB. Bit weight = .0055 degrees, Model 5116. 14 is LSB. Bit weight = .022 degrees, Model 5114. Pins 15 and 16 are not brought out on Model 5114.
±15V	Supply Voltages
RH, RL	Reference Voltage Input
S1 ,S2, S3, S4	Output Analog Signals (Synchro or Resolver Output) - Pin S4 is not present for the synchro output.

Absolute Maximum Ratings

Reference Input . . . . . 120% of Normal Voltage
Power Supply Voltage (±15V) . . . . . ±18 V-dc
Digital Inputs . . . . . −0.3 to +6.5 V-dc
Storage Temperature . . . . . −65°C to +135°C

Although the digital inputs have integral transient protection, this protection is not a substitute for proper electrostatic handling procedures. This part is ELECTROSTATIC SENSITIVE and must be treated as such.



BOTTOM VIEW

BOTTOM VIEW

NOTES:
1. Dimensions shown in inches and (mm)
2. Pins are gold plated (50μ inch min.)
3. Case material is glass filled diallyl phthalate.

TOLERANCES:
.XX = ±.020 (±.51)
.XXX = ±.010 (±.25)

MECHANICAL OUTLINE

Ordering Information

DSC5116 - T F R O M

Temperature Range

1 = 0°C to +70°C
2 = −55°C to +85°C

Frequency

4 = 400 Hz
6 = 60 Hz
(a separate transformer Module STM5116-60 is required)

Mil Specification

B = MIL-STD-883B
S = Standard

Output Voltage

1 = 11.8 V-rms L-L
2 = 26.0 V-rms L-L
9 = 90.0 V-rms L-L

Reference Voltage

2 = 26 V-rms
5 = 115 V-rms

SPECIFY **DRC5116** FOR RESOLVER OUTPUT

SPECIFY **MODEL 5114** FOR 14-BIT INDUSTRY STANDARD PIN-OUT

Other products available from NATEL

- **3 arc-second accurate,** Programmable Dynamic Angle Simulator that includes 4 Related Instruments and is totally A.T.E. Programmable (L200).
- Hybrid (36-pin DDIP size) Synchro(Resolver)-to-Digital converters that operate from **a single +5V power supply** and offer excellent features such as BIT, AGC, low power dissipation and more (Models 1006, 1056, 1046 and 1044).
- 1.3 arc-minute accuracy, high power, Digital-to-Synchro converters that **do not require any DC power supplies** (Models 5031 and 5131).
- Second generation Four Quadrant Multiplying Sin/Cos DAC (HDSC2026).
- **2-channel** Digital-to-Sin/Cos converter in a single 36-pin hybrid (HDSC2036).
- 2 VA output, Digital to Resolver Converter in a 32-pin package (HDR2116).
- Resolver Control Differential Transmitter in a single 36-pin package (HCDX3106).

A wide range of applications assistance is available from Natel. Application notes can be requested when available . . . and Natel's applications engineers are at your disposal for solving specific problems.

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