The CD-552R2 is an on-board phase detector possessing frequencies falling within the range of 100 Hz to 20 kHz.

The signal system is composed of the phase sensitive detector (PSD), low-pass filter (LPF), and output amplifier. A low-pass expansion of output low-pass filter cut-off frequency is available with the addition of one external resistor, and the gain setting (1 to 10) is also enabled. The reference signal system consists of a 0°-90° phase shifter and 50%-duty circuit, which enables the detection of A sin φ or A cos φ phase. The phase detection with double frequency is permitted if 2f mode is placed through the connection with the specified pin.

The CD-552R2 is in a 6-surface shielded 20-pin single inline package (SIP), which is a great contributor to the implementation of high precision signal processing and high density mounting.

### Absolute maximum ratings
- Supply voltage (V) ±18 V
- Signal input voltage (SIG IN) ±5 V
- Reference signal input voltage (REF IN) −0.5 V to +5.5 V
- Logic control voltage −0.5 V to +5.5 V

### Signal system
- Input impedance 10 kΩ ±5 % @100 Hz
- Linear max. input voltage ±10 V
- Allowable slew rate ±5 V/μs

### Phase detector
- Detection method Synchronous rectifying type by square-wave multiplication
- Detection characteristics
  - Vout = Vin·A·cos φ·Pin 16 open
  - Vout = Vin·A·sin φ·Pin 16 shorted
  - A·Gain, φ: Phase difference between SIG IN and REF IN (REF IN is a reference)
- Operating frequency range 100 Hz to 20 kHz
- Gain (φ=0) 1 Vdc/Vpk (sin-wave): Pins 12-13 open
  - 10 Vdc/Vpk (sin-wave): Pins 12-13 shorted
  - Selectable from 1 to 10 Vdc/Vpk with the external resistor (between Pins 12 and 13)
- Gain accuracy ±3 %
- Phase difference (SIG IN / REF IN) ±0.5° (typ.) @100 Hz
  - −0.5° ±0.5° (typ.) @20 kHz

### Low-pass filter
- Order 1-pole (6 dB/oct)
- Cut-off frequency 1 kHz ±10 %: Pins 9-10 shorted
  - Cut-off frequency range is expanded for lower frequency by external resistor and/or capacitor
- Detection output (SIG OUT) 50 Ω ±10 % @100 Hz
- Linear max. output voltage ±10 V @DC, load ≥2 kΩ
- Linear max. output current ±5 mA @DC
- Offset voltage ±15 mV @short in input, Gain 1 Vdc/Vpk
- Offset voltage adjustment Zero adjustment available with an external semi-fixed resistor (Pin 14)

### Reference signal system
- Reference signal input (REF IN)
  - Input circuit (REF IN) CMOS schmitt trigger input, pulled up by 100 kΩ resistor
    - +3.5 V / +1.5 V
  - Input voltage CMOS 0/5 V level
  - Setting time When REF IN is turned on: Approx. 10 s
    - When REF IN frequency is changed: Approx. 5 s
  - Single edge (1f) mode A rising or falling edge is regarded as a reference
  - Mode setting Unconnected REF IN (Pin 18) and REF POL (Pin 17)
  - Input circuit (REF POL) CMOS schmitt trigger input, pulled up by 100 kΩ resistor
  - Polarity switch (REF POL) Pin 17 open or +5 V: The rising edge regarded as a reference
  - Pulse duration ≤50 ns

### Input frequency range
- 100 Hz to 20 kHz
- Dual edge (2f) mode Both rising and falling edge are regarded as a reference
- Mode setting Connected REF IN (Pin 18) and REF POL (Pin 17)
- Input waveform Duty ratio 50%
- Input frequency range 100 Hz to 10 kHz

### 0°-90° phase shifter (SIN/COS)
- Function The detection of COS or SIN is made possible by pin 16
- 0°-90° phase difference −90° ±0.5° @20 kHz
- Input circuit (SIN/COS) CMOS schmitt trigger input, pulled up by 100kΩ resistor
- Control Logic Pin 16 open or +5 V (0° (cos))
  - 0° −90° (sin)

### Power supply
- Operating voltage range ±15 V ±1 V
- Quiescent current ±25 mA (max.), ±20 mA (typ.)
  - −20 mA (max.), −12 mA (typ.)

### General
- Specified temperature 23°C ±5°C
- Operating environment −20°C to 70°C, 10 %RH to 90 %RH
- Storage environment −30°C to 80°C, 10 %RH to 80 %RH
- Package type Type SS02 (20-pin shielded SIP)
- Dimensions 66.7 x 10.5 x 19.0 mm (not including protrusions)
- Weight (NET) Approx. 20 g
- RoHS Directive 2011/65/EU

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**Basic Connection Diagram**

[Diagram showing connections and pinouts]

**Block Diagram**

[Diagram showing block diagram and connections]

NF Corporation