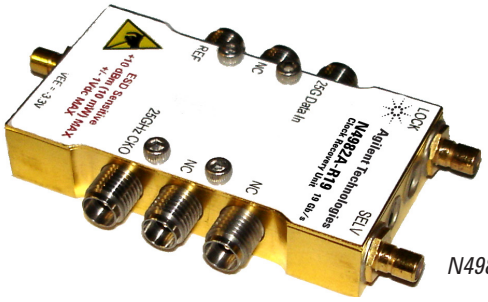
Agilent

# N4982A Clock Recovery Unit

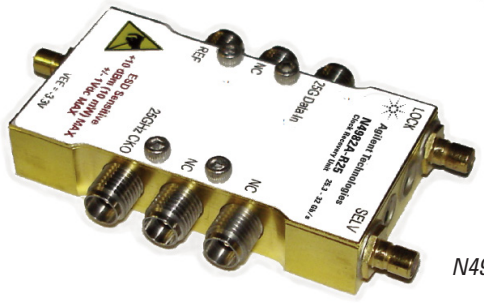
# Data Sheet

## For 100GbE, Fiberchannel, Infiniband, and 40G or SONET/SDH Applications

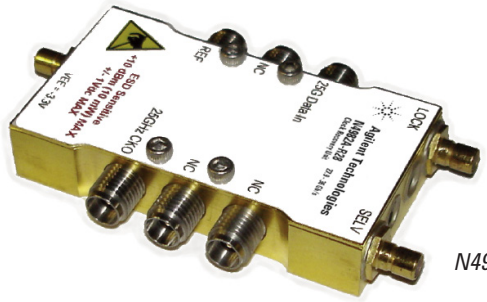
- Low jitter output clock
- Low power dissipation
- Precision connectors
- Excellent signal quality
- Single low voltage DC supply




*N4982A-R19 19 to 26 Gb/s , and 39.8 to 44.0 Gb/s*




*N4982A-R25 25.3 to 32 Gb/s*




*N4982A-R28 27.9 to 36 Gb/s*

***Anticipate ___Accelerate ___Achieve***

**Agilent Technologies**

# N4982A Clock Recovery Units

Compliant with RoHS WEE requirements

## Description

The N4982A series of clock recovery units (CRU) cover data rates from 19 to 36 Gb/s and 39.8 to 44 Gb/s with three different model options. The CRU modules utilize silicon germanium (SiGe) technology and offer both small size, and low power consumption.

## Applications

The N4982A CRU modules can be used to extract a low jitter clock for 40G and 100G applications such as IEEE 802.3, OIF/CEI 25/28G, 32G Fiberchannel, 25G Infiniband, etc. The CRU's have sufficient bandwidth to operate both at common base rates, e.g. 25.78125 Gb/s, as well as in applications that require added bandwidth for forward error correction (FEC), e.g. 27.95, 30.9375 Gb/s. Broadband test systems will benefit from the low power dissipation, precision connectors and excellent signal quality.

## Specifications at 33 deg C Case Temperature

*Table 1*

| Parameter | Model-Option Number | | | | Units |
|---|---|---|---|---|---|
| | N4982A-R19 | | N4982A-R25 | N4982A-R28 | |
| **Data Input** | | | | | |
| Bit rate | 19.0 to 26.0 | 39.8 to 44.0 | 25.3 to 32.0 | 27.9 to 36.0 | Gb/s |
| Amplitude | 100 to 1400 | 150 to 1400 | 50 to 1400 | 50 to 1400 | mV p-p |
| **Reference Clock Input** | | | | | |
| Type | Half-rate | Quarter-rate | Quarter-rate | Quarter-rate | |
| Frequency | 9.5 to 13.0 | 9.95 to 11.0 | 6.325 to 8.0 | 6.975 to 9.0 | GHz |
| Amplitude | 200 to 1400 | | 50 to 1400 | 50 to 1400 | mV p-p |
| **Clock Output** | | | | | |
| Type | Full-rate | Half-rate | Half-rate | Half-rate | |
| Frequency | 19.0 to 26.0 | 19.9 to 22.0 | 12.65 to 16.0 | 13.95 to 18.0 | GHz |
| Amplitude (typical) | >150 | | >320 | >150 | mV p-p |
| Jitter RMS (nominal) | 0.5 | | 0.5 | 0.5 | ps |
| **DC Supply** | | | | | |
| Voltage | -3.6 V dc | | -3.3 V dc | -3.3 V dc | V |
| Current (nominal) | 270 | | 220 | 220 | mA |

## Absolute Maximum Ratings

*Table 2*

| Parameter | Value |
|---|---|
| Supply Voltage (VEE) | -3.8 V |
| Control voltage applied to SELV and LOCk | Max: +0.05 V<br>Min: VEE - 0.05 V |
| Ref input power (REF) | +10 dBm |
| DC input voltage to DIN, REF and CKO | +/- 1 V |
| Operating Temperature | 0 to +70 deg C |
| Storage Temperature | -50 to +125 dec C |

## Performance data N4982A-R19

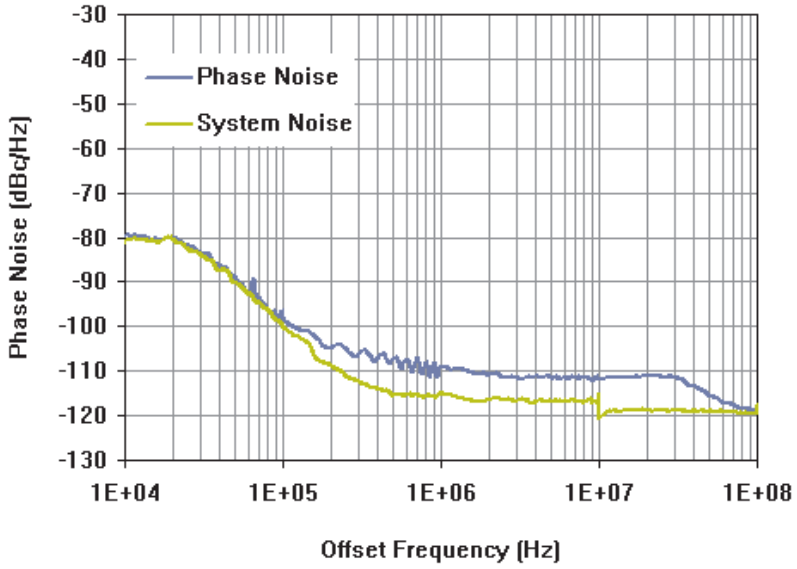



*Figure 1. Phase noise of CKO at 25.78125 GHz locked to 2e31, 25.78125 Gb/s data*

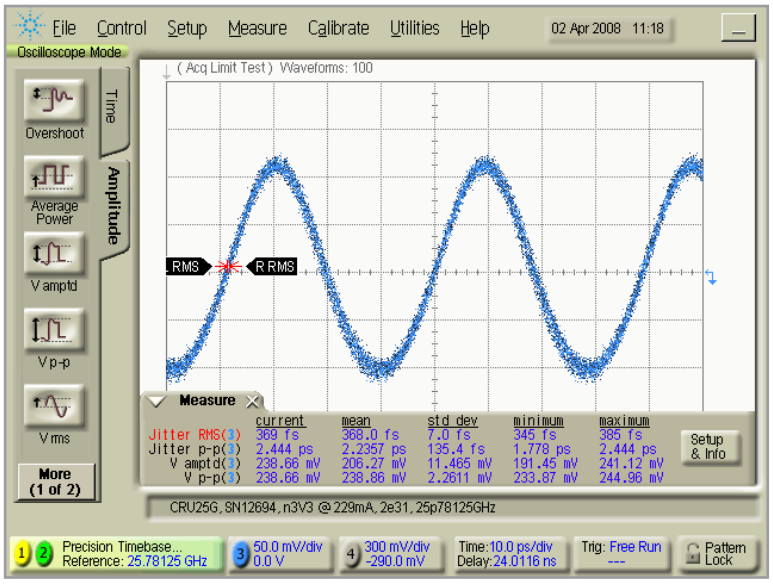



*Figure 2. 25.78125 GHz clock output Locked to 2e31, 25.78125 Gb/s data*

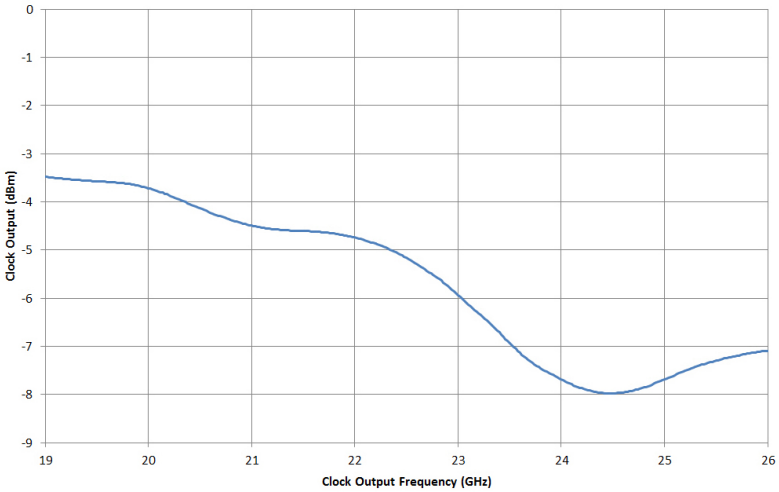



*Figure 3. Output power vs frequency*

## Performance data N4982A-R25

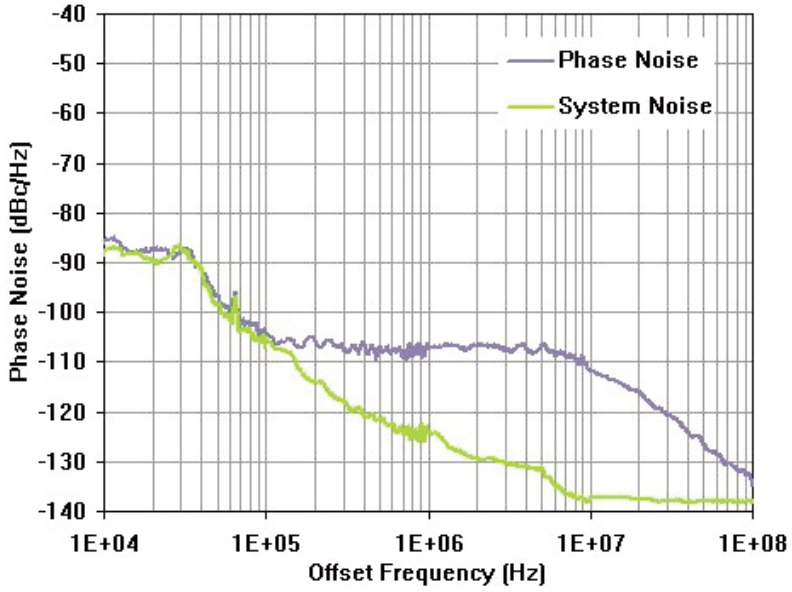



*Figure 4. Phase noise of CKO at 13.975 GHz Locked to 2 e15, 27.95 Gb/s data*

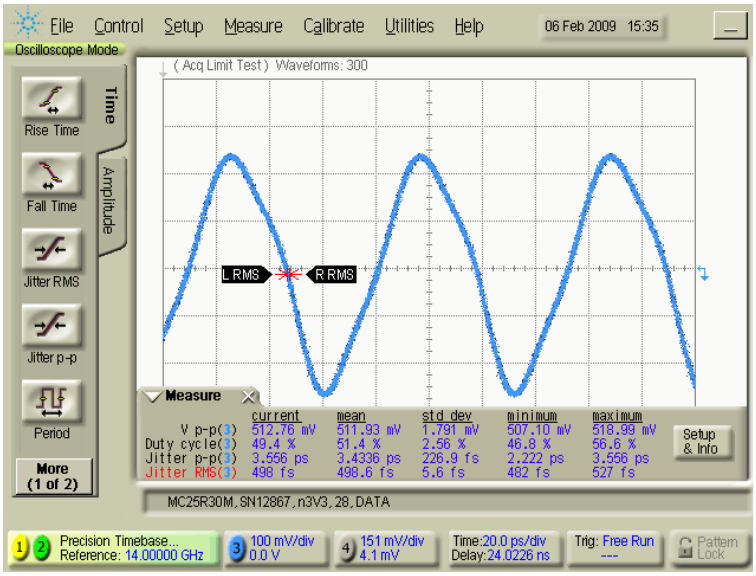



*Figure 5. 13.975 GHz clock output Locked to 2 e15, 27.95 Gb/s data*

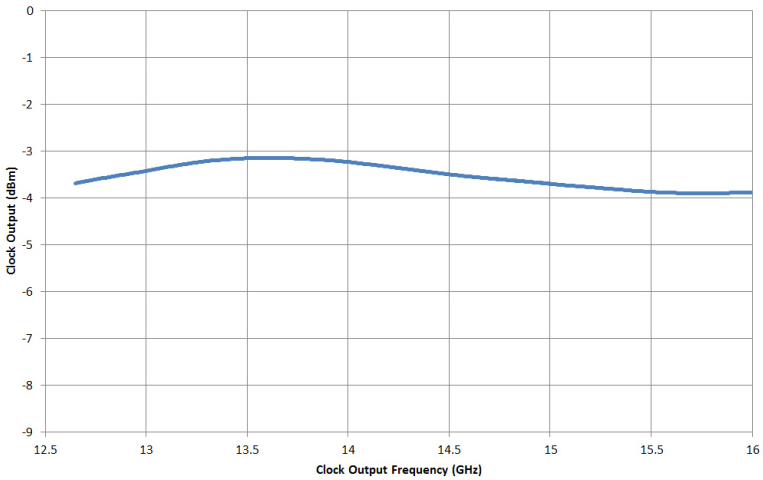



*Figure 6. Output vs frequency*

## Performance data N4982A-R28

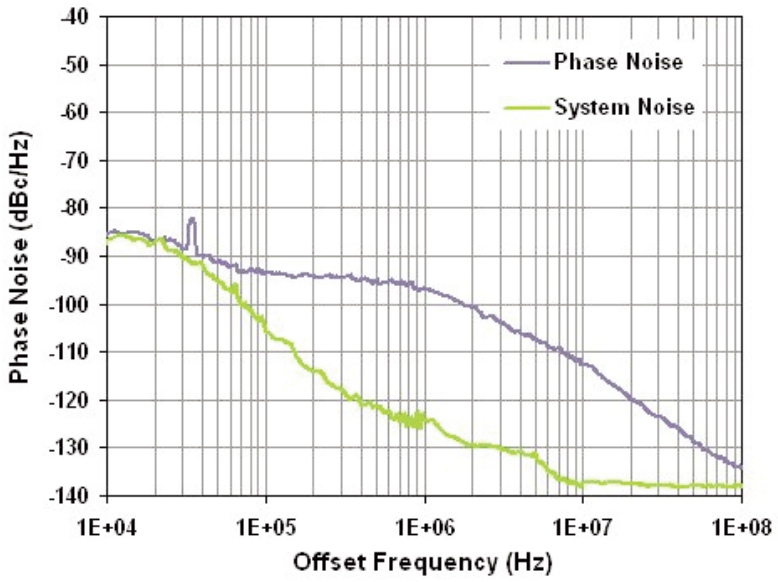



*Figure 7. Phase noise of CKO at 14.0 GHz Locked to 2e15, 28.0 Gb/s data*

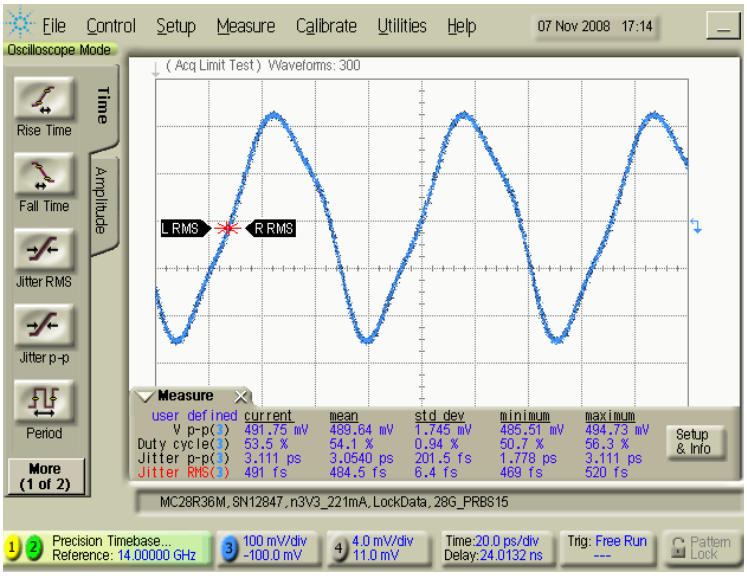



*Figure 8. 14.0 GHz clock output Locked to 2e15, 28.0 Gb/s data*

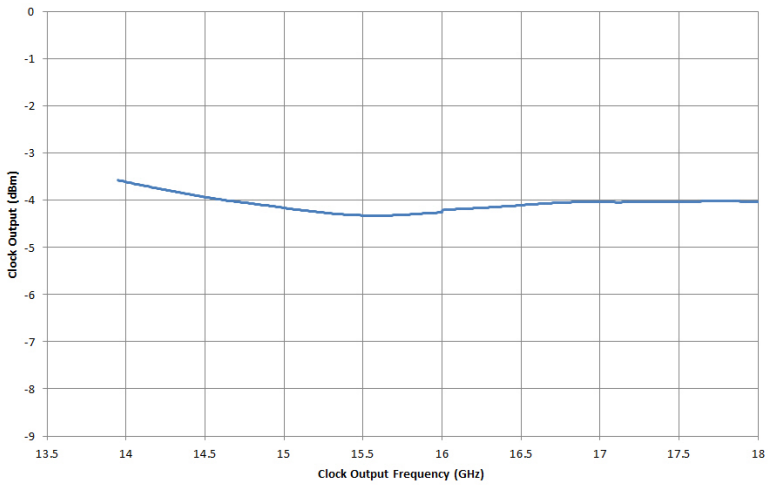



*Figure 9. Output power vs frequency*

## N4982A functional block diagram

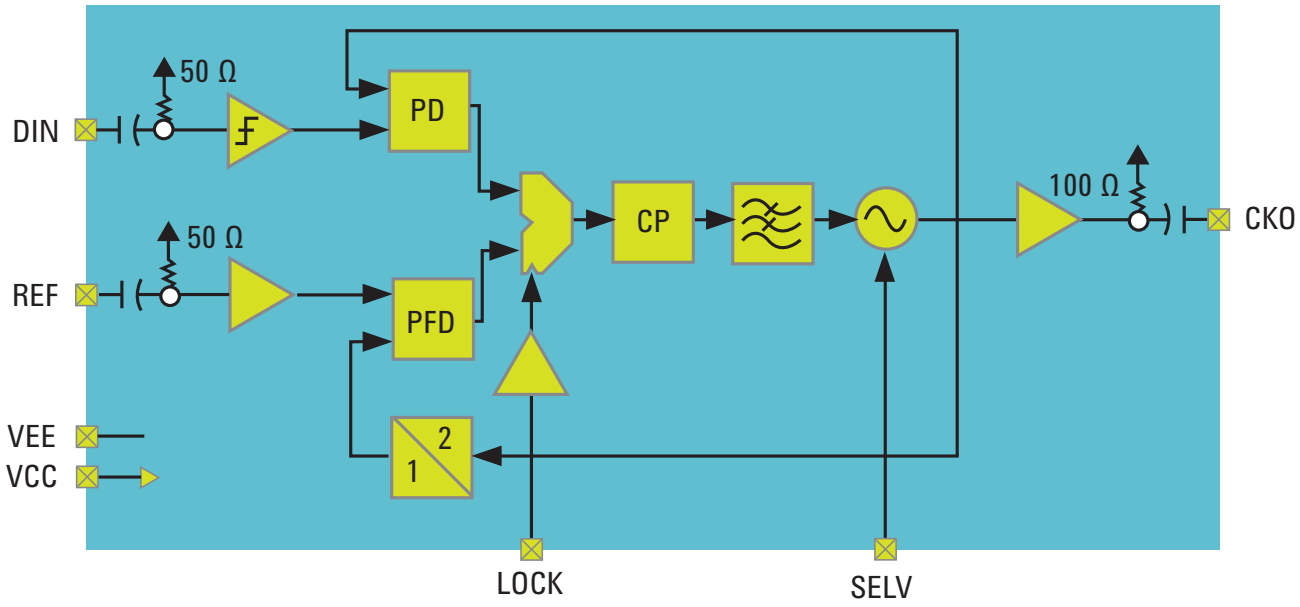



*Figure 10. Functional block diagram*

## Pin description (see Figure 11 below)

*Table 3*

| Name | Pin | Description | Note | Connector |
|---|---|---|---|---|
| LOCK | 1 | Reference input selector | Internal PLL reference selector between input data and reference clock | SMB |
| SELV | 2 | Frequency range selector | Selects between two VCOs for lower/upper band | SMB |
| CKO | 5 | Clock output | AC-coupled, single ended output | 2.92 mm |
| VEE | 6 | Negative supply voltage | Center pin -3.3 or -3.6 V, shield/case is ground | SMB |
| REF | 7 | Reference clock input | AC coupled input | 2.92 mm |
| DIN | 9 | Data input | AC-coupled, single ended input | 2.92 mm |
| NC | 3, 4, 8 | No connect | | |

## LOCK logic

*Table 4*

| Parameters | State | Min | Typ | Max |
|---|---|---|---|---|
| Low (default) | Reference clock | – | –3.3 V | – |
| High | Data | – | 0 V | – |

## SELV logic

*Table 5*

| Model-Option Number | Data rate range | SELV state | SELV voltage |
|---|---|---|---|
| N4982A-R19 | 19.0 to 22.2 Gb/s | Low (default) | VEE (-3.6 V) |
| | 39.8 to 44.0 Gb/s | Low (default) | VEE (-3.6 V) |
| | 22.2 to 26.0 Gb/ | High | 0 V |
| N4982A-R25 | 25.3 to 30.0 Gb/s | High | 0 V |
| | 27.5 to 32.0 Gb/s | Low (default) | VEE (-3.3 V) |
| N4982A-R28 | 27.9 to 32.0 Gb/s | Low (default) | VEE (-3.3 V) |
| | 32.0 to 36.0 Gb/s | High | 0 V |

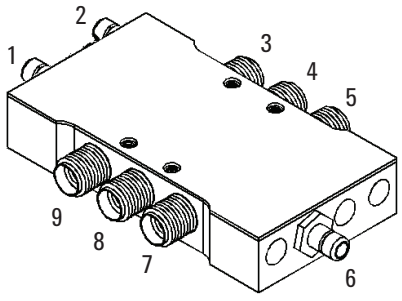



*Figure 11. Module outline*

## N4982A application note

### Clock recovery

The N4982A clock recovery unit has two phase locked loops with separate inputs—the REF input for training the loop to the right frequency, and the Data (DIN) input for phase locking the loop to the actual data. Refer to the block diagram. The CRU requires a ½ or ¼ rate clock for training the PLL. Once the loop is trained, the input can be switched over to the data input by setting the LOCK pin (pin 1) High (0V).

### Clock recovery setup procedure

1. Connect both data and reference inputs to the device. For example, with the N4982A-R19 if data rate is 25 Gb/s, then reference clock is 12.5 GHz (sine or square). Make sure that the LOCK pin (pin 1) is set to Low (VEE) or left open (it defaults to logic state Low).
2. Select the appropriate VCO frequency band by connecting SELV either VEE or 0V. For example, with the N4982A-R19 if the data rate is 25 Gb/s, then connect SELV to 0 V to enable the 22.2 to 26.0 GHz VCO band.
3. Monitor the output frequency to see if the loop has locked to the desired frequency. For this example, the loop is locked if CKO is 25 GHz.
4. Once the loop is locked (i.e. trained), switch the LOCK pin to High, or 0 V, to lock onto the data input.

## Packaging information

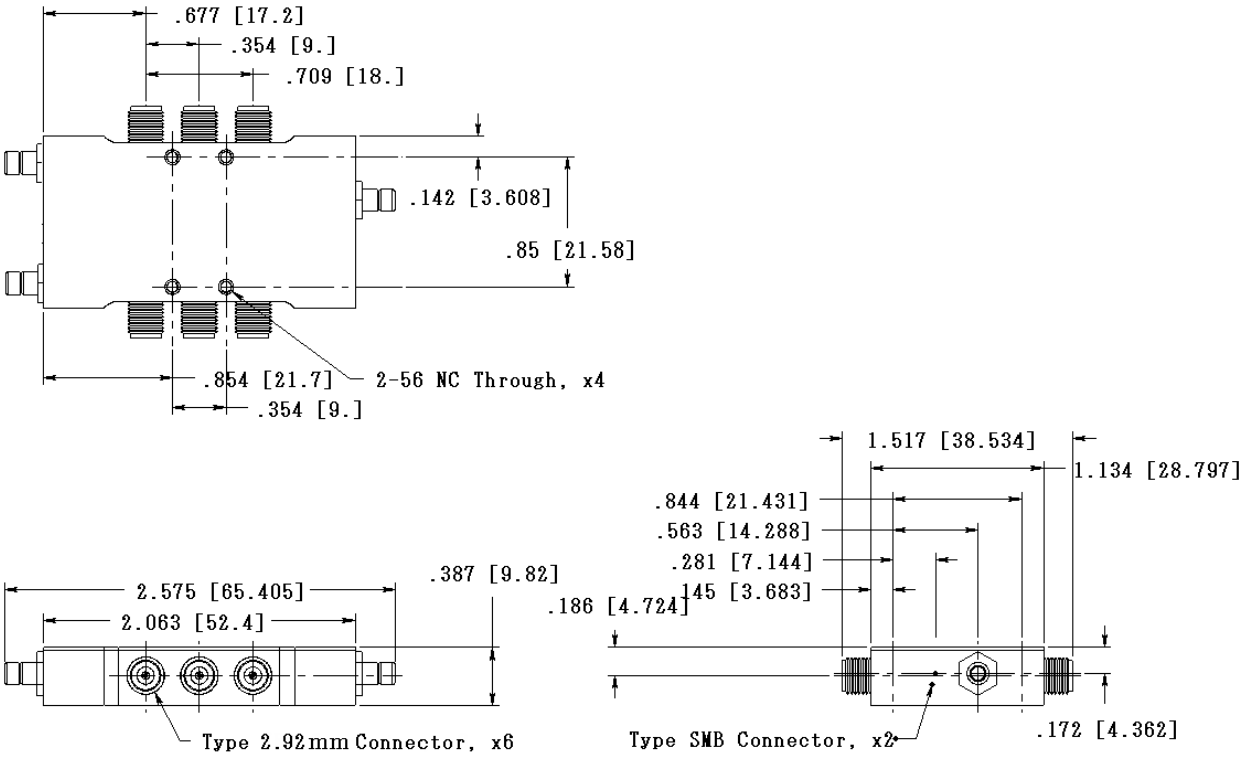



*Figure 12. All measurements in inches (mm)*

**www.agilent.com**
www.agilent.com/find/N4982A

### Agilent Email Updates

**www.agilent.com/find/emailupdates**
Get the latest information on the products and applications you select.

### Agilent Channel Partners

**www.agilent.com/find/channelpartners**
Get the best of both worlds: Agilent's measurement expertise and product breadth, combined with channel partner convenience.

### Three-Year Warranty

**www.agilent.com/find/ThreeYearWarranty**
Agilent's combination of product reliability and three-year warranty coverage is another way we help you achieve your business goals: increased confidence in uptime, reduced cost of ownership and greater convenience.

### Agilent Advantage Services

**www.agilent.com/find/AdvantageServices**
Accurate measurements throughout the life of your instruments.

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:
www.agilent.com/find/contactus

**Americas**

| | |
|---|---|
| Canada | (877) 894 4414 |
| Brazil | (11) 4197 3600 |
| Mexico | 01800 5064 800 |
| United States | (800) 829 4444 |

**Asia Pacific**

| | |
|---|---|
| Australia | 1 800 629 485 |
| China | 800 810 0189 |
| Hong Kong | 800 938 693 |
| India | 1 800 112 929 |
| Japan | 0120 (421) 345 |
| Korea | 080 769 0800 |
| Malaysia | 1 800 888 848 |
| Singapore | 1 800 375 8100 |
| Taiwan | 0800 047 866 |
| Other AP Countries | (65) 375 8100 |

**Europe & Middle East**

| | |
|---|---|
| Belgium | 32 (0) 2 404 93 40 |
| Denmark | 45 45 80 12 15 |
| Finland | 358 (0) 10 855 2100 |
| France | 0825 010 700* |
| | *0.125 €/minute |
| Germany | 49 (0) 7031 464 6333 |
| Ireland | 1890 924 204 |
| Israel | 972-3-9288-504/544 |
| Italy | 39 02 92 60 8484 |
| Netherlands | 31 (0) 20 547 2111 |
| Spain | 34 (91) 631 3300 |
| Sweden | 0200-88 22 55 |
| United Kingdom | 44 (0) 118 927 6201 |

*For other unlisted countries:*
www.agilent.com/find/contactus
*(BP2-19-13)*

Product specifications and descriptions in this document subject to change without notice.


Published in USA, August 12, 2013
5991-0701EN

Agilent Technologies