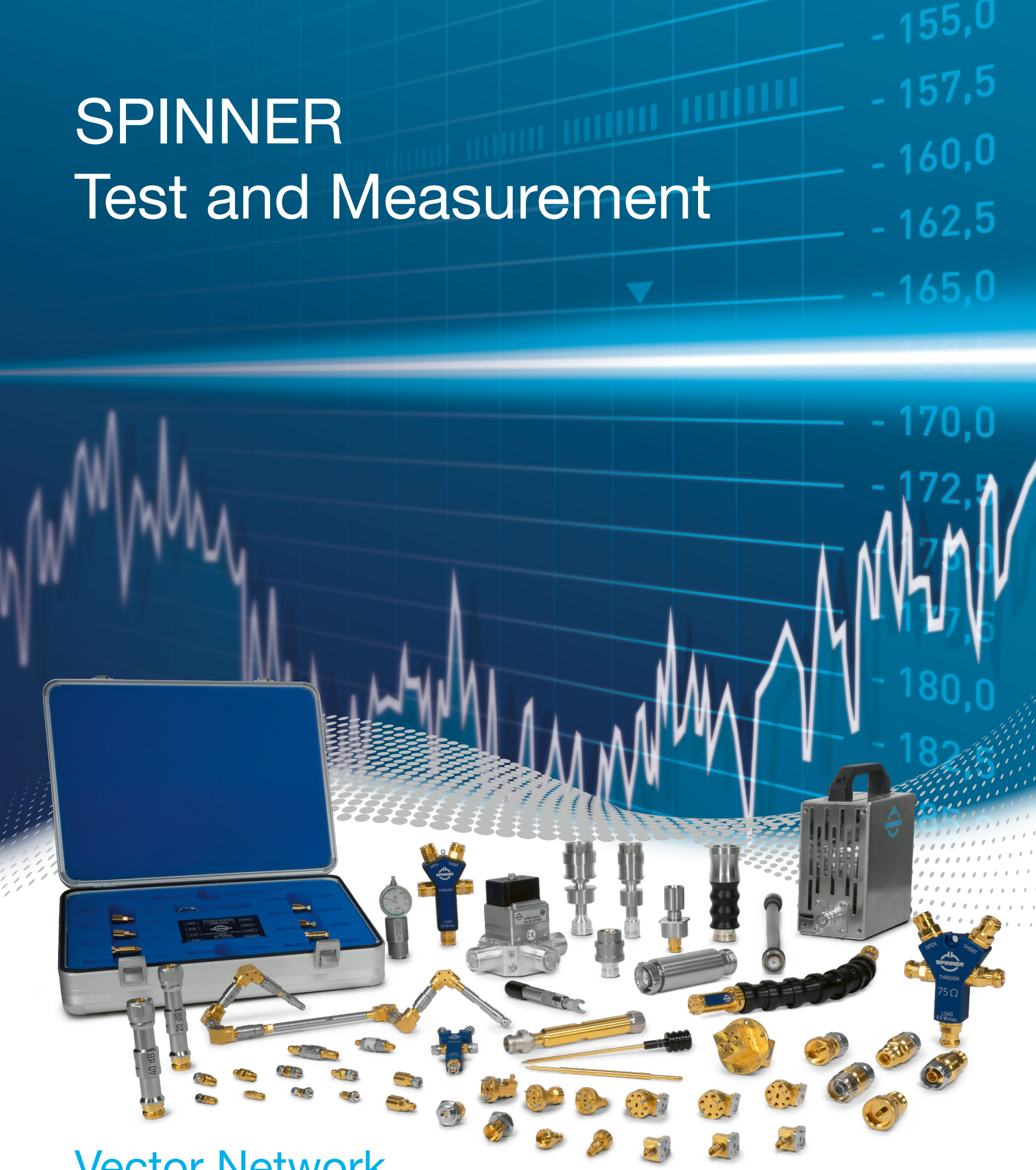
SPINNER
Test and Measurement



Vector Network Analyzer Calibration

Edition A/2020

HIGH FREQUENCY PERFORMANCE WORLDWIDE
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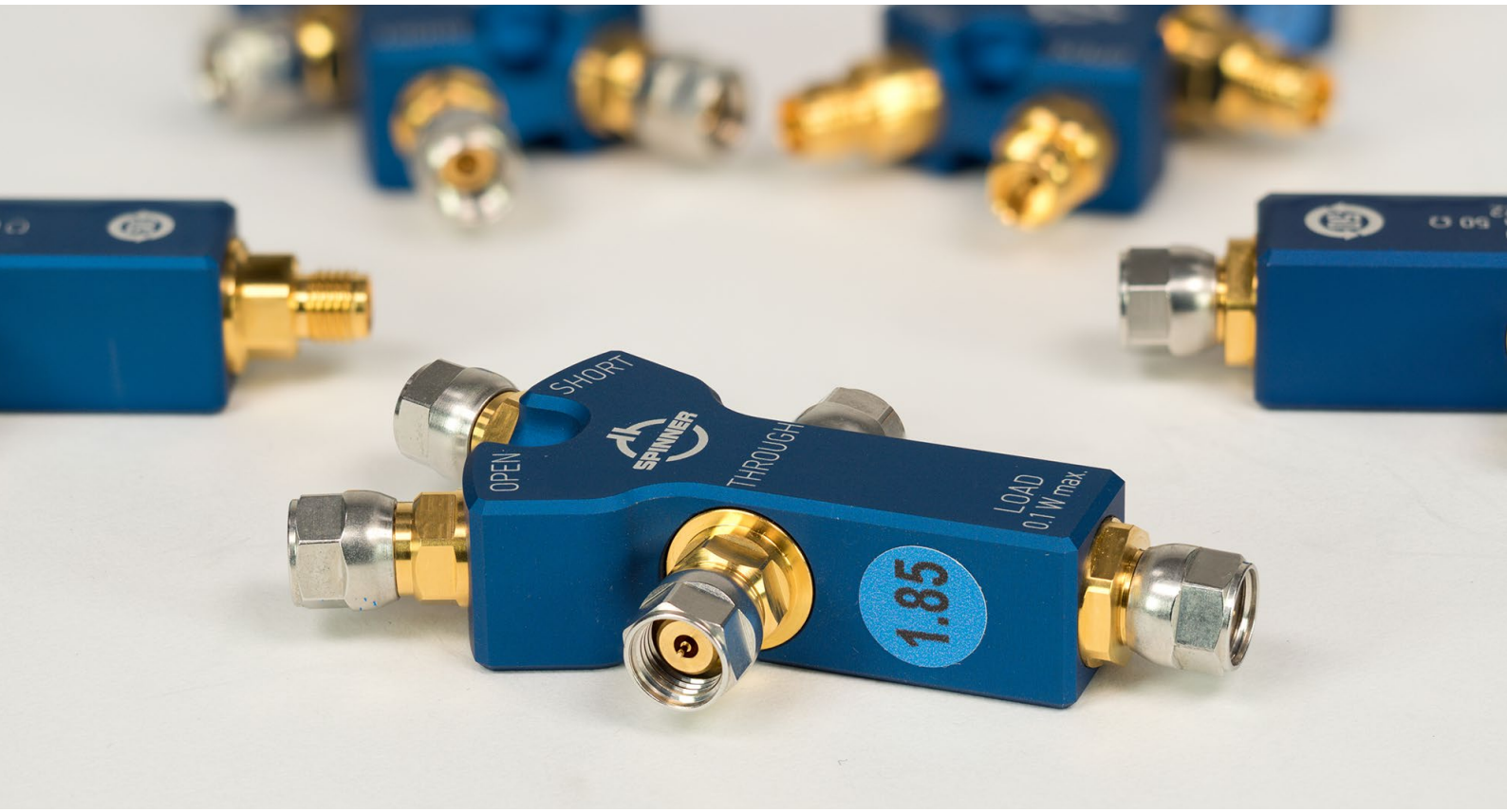
Content

Vector Network Analyzer Calibration



SPINNER test and calibration equipment for optimal measurements

In this day and age, no development, production, testing, or quality control department that deals with RF signals on coaxial lines can afford to dispense with state-of-the-art equipment. It's essential to use vector network analyzers (VNAs) in particular with high-precision connectors, terminations, and adapters.

Systematic errors can be fixed by calibrating the VNA. Different calibration standards with defined and known electrical characteristics are applied and compared to identify error coefficients. A technique called vector error correction is used to characterize error terms while applying known standards in order to remove errors from actual measurements and increase the accuracy of the results. In fact, the precision of the measurement is largely determined by the calibration.

A VNA can be calibrated in different ways depending on the required degree of accuracy. The methods used differ in both the number and the type of the calibration standards applied. The most commonly used calibration approaches are OSL (which stands for open-short-load) for single-port measurements and OSLT (for open-short-load-through) for multiple-port measurements.

For both of these, SPINNER supplies a range of equipment that covers everything from a high-precision kit for laboratory use to compact versions for field applications. Kits are available with 7 – 16, 4.3 – 10, Type N, NEX10®, 2.2 – 5, 3.5 mm, 2.92 mm, 2.4 mm, 1.85 mm and 1.35 mm adapters.

SPINNER has set new standards of accuracy with this product line, which includes a large family of coaxial test equipment with outstanding electrical and mechanical attributes for use in laboratory and production environments at frequencies up to 90 GHz.

3-in-1 OSL Compact Calibration Kits, 50 Ω, Production Grade

BN 533863R000

- The all-in-one compact calibration kit for one port calibration
- Open, short and load (OSL) in one compact handy device
- Applicable to all VNA
- For frequencyies from DC to 6 GHz

Part Number	Interface	Frequency Range	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.
BN 533866R000 **BN 533865R000**	7 – 16 male 7 - 16 female	DC to 6 GHz	≤ 1.5°	≤ 1.0°	≥ 40 dB
			Phase Shift	Phase Shift	
BN 533864R000 **BN 533863R000**	Type N male Type N female	DC to 6 GHz	180° +/-	180° +/-	≥ 42 dB

Calibration data in formats for the common VNAs are included in the kit.

4-in-1 OSLT Compact Calibration Kits, 50 Ω, Production Grade

BN 533846

- The all-in-one compact calibration kit
- Open, short, load (OSL) and through (OSLT) in one compact handy device
- Simplified calibration of more-port VNAs
- Applicable to all VNA
- Color coding for displaying interface size information
- For frequencies from DC to 6 GHz up to DC to 13 GHz

Part Number	Interface	Frequency Range	Open Phase deviation, max	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.	Through Insertion loss, max.
BN 533846 **BN 533845**	7 – 16 male 7 – 16 female	DC to 6 GHz	≤ 1.5°	≤ 1.50°	≥ 40 dB	≥ 34 dB	≤ 0.10 dB
BN 533844 **BN 533843**	Type N male Type N female	DC to 4 GHz 4 to 6 GHz 6 to 8 GHz 8 to 9 GHz	≤ 2.0° ≤ 3.0° ≤ 3.0° ≤ 3.0°	≤ 1.25° ≤ 1.25° ≤ 1.25° ≤ 1.25°	≥ 42 dB ≥ 42 dB ≥ 35 dB ≥ 35 dB	≥ 36 dB ≥ 31 dB ≥ 31 dB ≥ 28 dB	≤ 0.05 dB ≤ 0.10 dB ≤ 0.10 dB ≤ 0.10 dB
BN 533829 **BN 533828**	3.5 mm male 3.5 mm female	DC to 4 GHz 4 to 8 GHz 8 to 13 GHz	≤ 1.5° ≤ 3.0° ≤ 4.5°	≤ 1.0° ≤ 2.0° ≤ 3.5°	≥ 40 dB ≥ 34 dB ≥ 28 dB	≥ 34 dB ≥ 28 dB ≥ 25 dB	≤ 0.10 dB ≤ 0.10 dB ≤ 0.15 dB

Calibration data in formats for the common VNAs are included in the kit.

4-in-1 OSLT Compact Calibration Kits, 75 Ω, Production Grade

BN 533857R000

- The all-in-one compact calibration kit
- Open, short, load (OSL) and through (OSLT) in one compact handy device
- Simplified calibration of more-port VNAs
- Applicable to all VNA
- Characteristic golden color in contrast to 50 ohm kits
- For frequency's from DC to 3 GHz up to DC to 20 GHz
- N 75 is a 75 Ω interface not intermateable with Type N (50 Ω) versions

Part Number	Interface	Frequency Range	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.	Through Insertion loss, max.
BN 533857R000 **BN 533858R000**	Type N 75	DC to 3 GHz	≤ 2.0°	≤ 1.5°	≥ 36 dB	≥ 34 dB	≤ 0.05 dB
BN 534029 **BN 534030**	Type N 75	DC to 4 GHz 4 to 8 GHz 8 to 12 GHz	≤ 2.5° ≤ 3.5° ≤ 4.5°	≤ 2.0° ≤ 3.0° ≤ 4.0°	≥ 38 dB ≥ 31 dB ≥ 27 dB	≥ 31 dB ≥ 28 dB ≥ 23 dB	≤ 0.04 dB ≤ 0.04 dB ≤ 0.04 dB
BN 534050 **BN 534051**	Type N 75	DC to 4 GHz 4 to 8 GHz 8 to 12 GHz 12 to 20 GHz	≤ 1.5° ≤ 2.5° ≤ 4.5° ≤ 5.0°	≤ 1.0° ≤ 2.0° ≤ 3.5° ≤ 4.5°	≥ 38 dB ≥ 34 dB ≥ 30 dB ≥ 25 dB	≥ 38 dB ≥ 34 dB ≥ 30 dB ≥ 25 dB	≤ 0.06 dB ≤ 0.06 dB ≤ 0.06 dB ≤ 0.06 dB

Calibration data in formats for the common VNAs are included in the kit.

4-in-1 OSLT Compact Calibration Kits, 50 Ω, Instrument Grade

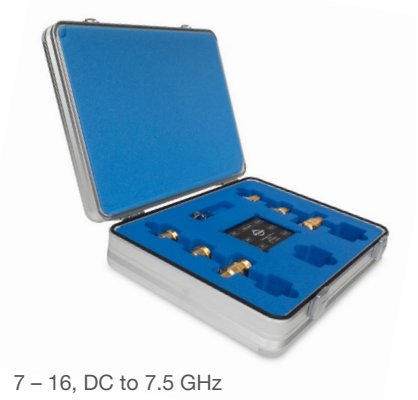
BN 533755

- The all-in-one compact calibration kit
- Open, short, load (OSL) and through (OSLT) in one compact handy device
- Simplified calibration of more-port VNAs
- Applicable to all VNA
- Color coding for displaying interface size information
- For frequencies from DC to 6 GHz up to DC to 70 GHz+

Part Number	Interface	Frequency Range	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.	Through Insertion loss, max.
BN 533807	4.1 – 9.5 male	DC to 4 GHz			≥ 40 dB	≥ 35 dB	≤ 0.04 dB
BN 533808	4.1 – 9.5 female	4 to 6 GHz			≥ 40 dB	≥ 30 dB	≤ 0.04 dB
BN 533301	4.3 – 10 male	DC to 4 GHz	≤ 1.5°	≤ 1.0°	≥ 40 dB	≥ 35 dB	≤ 0.04 dB
BN 533302	4.3 – 10 female	4 to 6 GHz	≤ 2.5°	≤ 2.0°	≥ 35 dB	≥ 30 dB	≤ 0.04 dB
BN 533313	4.3 – 10 male	DC to 4 GHz	≤ 1.5°	≤ 1.0°	≥ 40 dB	≥ 35 dB	≤ 0.04 dB
		4 to 6 GHz	≤ 2.5°	≤ 2.0°	≥ 35 dB	≥ 30 dB	≤ 0.04 dB
BN 533314	4.3 – 10 female	6 to 12 GHz	≤ 3.0°	≤ 2.5°	≥ 30 dB	≥ 25 dB	≤ 0.04 dB
BN 533879	Type N male	DC to 4 GHz	≤ 2.0°	≤ 1.5°	≥ 38 dB	≥ 38 dB	≤ 0.035 dB
		4 to 6 GHz	≤ 2.0°	≤ 1.5°	≥ 34 dB	≥ 34 dB	≤ 0.035 dB
		6 to 8 GHz	≤ 3.0°	≤ 2.5°	≥ 34 dB	≥ 34 dB	≤ 0.035 dB
BN 533880	Type N female	8 to 9 GHz	≤ 3.0°	≤ 2.5°	≥ 28 dB	≥ 28 dB	≤ 0.035 dB
		9 to 18 GHz	≤ 4.0°	≤ 3.0°	≥ 28 dB	≥ 28 dB	≤ 0.035 dB
BN 225301	2.2 – 5 male	DC to 4 GHz	≤ 1.5°	≤ 1.0°	≥ 40 dB	≥ 35 dB	≤ 0.06 dB
BN 225302	2.2 – 5 female	4 to 6 GHz	≤ 2.5°	≤ 2.0°	≥ 37 dB	≥ 31 dB	≤ 0.06 dB
BN 533881	3.5 mm male	DC to 5 GHz	≤ 1.5°	≤ 1.5°	≥ 34 dB	≥ 42 dB	≤ 0.035 dB
		5 to 15 GHz	≤ 3.0°	≤ 3.0°	≥ 30 dB	≥ 36 dB	≤ 0.035 dB
BN 533882	3.5 mm female	15 to 26.5 GHz	≤ 4.5°	≤ 4.5°	≥ 30 dB	≥ 32 dB	≤ 0.035 dB
BN 533897	2.92 mm male	DC to 4 GHz	≤ 1.5°	≤ 1.5°	≥ 39 dB	≥ 30 dB	≤ 0.04 dB
		4 to 10 GHz	≤ 2.5°	≤ 2.0°	≥ 33 dB	≥ 26 dB	≤ 0.04 dB
		10 to 26.5 GHz	≤ 4.5°	≤ 3.5°	≥ 28 dB	≥ 26 dB	≤ 0.04 dB
BN 533898	2.92 mm female	26.5 to 40 GHz	≤ 5.0°	≤ 4.5°	≥ 24 dB	≥ 21 dB	≤ 0.04 dB
BN 534913	2.92 mm male	DC to 4 GHz	≤ 1.5°	≤ 1.5°	≥ 39 dB	≥ 30 dB	≤ 0.04 dB
		4 to 10 GHz	≤ 2.5°	≤ 2.0°	≥ 33 dB	≥ 26 dB	≤ 0.04 dB
		10 to 26.5 GHz	≤ 4.5°	≤ 3.5°	≥ 28 dB	≥ 26 dB	≤ 0.04 dB
BN 534914	2.92 mm female	26.5 to 40 GHz	≤ 5.0°	≤ 4.5°	≥ 24 dB	≥ 21 dB	≤ 0.04 dB
		40 to 44 GHz	≤ 5.0°	≤ 4.5°	≥ 22 dB	≥ 19 dB	≤ 0.04 dB
BN 533759	2.4 mm male	DC to 4 GHz	≤ 2.5°	≤ 2.0°	≥ 38 dB	≥ 30 dB	≤ 0.04 dB
		4 to 10 GHz	≤ 2.5°	≤ 3.5°	≥ 32 dB	≥ 26 dB	≤ 0.04 dB
		10 to 26.5 GHz	≤ 4.5°	≤ 3.5°	≥ 27 dB	≥ 26 dB	≤ 0.04 dB
BN 533760	2.4 mm female	26.5 to 40 GHz	≤ 5.0°	≤ 4.5°	≥ 23 dB	≥ 23 dB	≤ 0.04 dB
		40 to 50 GHz	≤ 5.0°	≤ 4.5°	≥ 23 dB	≥ 21 dB	≤ 0.04 dB
BN 533755	1.85 mm male	DC to 4 GHz	≤ 3.0°	≤ 2.0°	≥ 36 dB	≥ 30 dB	≤ 0.06 dB
		4 to 10 GHz	≤ 3.0°	≤ 3.0°	≥ 31 dB	≥ 26 dB	≤ 0.06 dB
		10 to 26.5 GHz	≤ 4.0°	≤ 3.0°	≥ 25 dB	≥ 26 dB	≤ 0.06 dB
BN 533754	1.85 mm female	26.5 to 50 GHz	≤ 6.0°	≤ 5.0°	≥ 22 dB	≥ 23 dB	≤ 0.06 dB
		50 to 67 GHz	≤ 7.0°	≤ 6.5°	≥ 20 dB	≥ 21 dB	≤ 0.06 dB
BN 533431	1.85 mm male	DC to 4 GHz	≤ 3.0°	≤ 2.0°	≥ 36 dB	≥ 30 dB	≤ 0.06 dB
		4 to 10 GHz	≤ 3.0°	≤ 3.0°	≥ 31 dB	≥ 26 dB	≤ 0.06 dB
		10 to 26.5 GHz	≤ 4.0°	≤ 3.0°	≥ 25 dB	≥ 26 dB	≤ 0.06 dB
		26.5 to 40 GHz	≤ 6.0°	≤ 5.0°	≥ 22 dB	≥ 23 dB	≤ 0.06 dB
		40 to 50 GHz	≤ 6.0°	≤ 5.0°	≥ 22 dB	≥ 21 dB	≤ 0.06 dB
BN 533430	1.85 mm female	50 to 67 GHz	≤ 7.0°	≤ 6.5°	≥ 20 dB	≥ 21 dB	≤ 0.06 dB
		67 to 70 GHz	≤ 7.0°	≤ 6.5°	≥ 18 dB	≥ 19 dB	≤ 0.06 dB

Calibration data in formats for the common VNAs are included in the kit.

OSL High Precision Calibration Kits, 50 Ω, Instrument Grade



- High-end S-parameter measurements
- Open, short and load (OSL): each one in male and female version
- For frequencies from DC to 7.5 GHz up to DC to 18 GHz

7 – 16, DC to 7.5 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.
BN 533810*	7 – 16	DC to 3 GHz ≤ 0.5° 3 to 6 GHz ≤ 1.0° 6 to 7.5 GHz ≤ 1.5°		DC to 7.5 GHz ≥ 44 dB
Set Components				
	male	**BN 806405R000**	**BN 806404R000**	**BN 533732R000**
	female	**BN 806505R000**	**BN 806504R000**	**BN 533733R000**

4.1 – 9.5, DC to 12.5 GHz

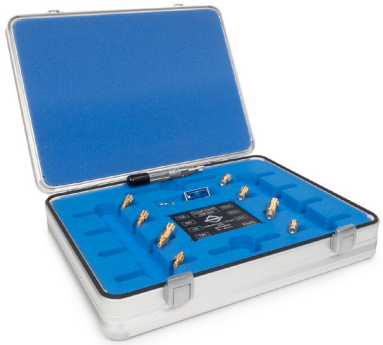
Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.
BN 533832*	4.1 – 9.5	DC to 12.5 GHz, see calibration data		DC to 6 GHz ≥ 40 dB 6 to 12.5 GHz ≥ 32 dB
Set components				
	male	**BN 533747**	**BN 533745**	**BN 987297**
	female	**BN 533746**	**BN 533744**	**BN 987397**

Type N, DC to 18 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.
BN 533831*	Type N	DC to 12 GHz ≤ 1.5° 12 to 18 GHz ≤ 2.0°		DC to 6 GHz ≥ 42 dB 6 to 9 GHz ≥ 35 dB 9 to 18 GHz ≥ 32 dB
Set components				
	male	**BN 533914R000**	**BN 533912R000**	**BN 533910R000**
	female	**BN 533915R000**	**BN 533913R000**	**BN 533911R000**

* Calibration data in formats for the common VNAs are included in the kit.
It includes individual calibration coefficients for every kit to achieve the best possible performance.

OSLT High Precision Calibration Kits, 50 Ω, Instrument Grade



- High-end S-parameter measurements
- Open, short, load and through (OSLT): each one in male and female version including through adapters, one with male-to-male and one with female-to-female connections
- Optionally a male-to-female is available
- For frequencies from DC to 7.5 GHz up to DC to 12.5 GHz

7 – 16, DC to 7.5 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533840*	7 – 16	DC to 3 GHz ≤ 0.5° 3 to 6 GHz ≤ 1.0° 6 to 7.5 GHz ≤ 1.5°		DC to 7.5 GHz ≥ 44 dB	DC to 4 GHz ≥ 40 dB 4 to 7.5 GHz ≥ 36 dB
Set components					
	male	**BN 806405R000**	**BN 806404R000**	**BN 533732R000**	**BN 393307R000**
	female	**BN 806505R000**	**BN 806504R000**	**BN 533733R000**	**BN 196404R000**
Option	male-female				**BN 756301R000**

4.3 – 10, DC to 12 GHz

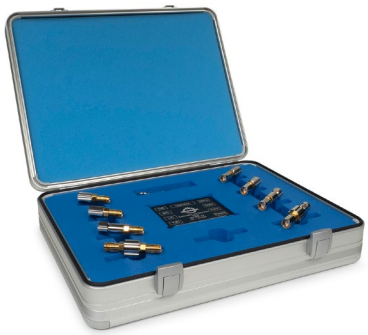
Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533312*	4.3 – 10	DC to 4 GHz ≤ 1.5° 4 to 6 GHz ≤ 2.5° 6 to 12 GHz ≤ 3.0°	DC to 4 GHz ≤ 1.0° 4 to 6 GHz ≤ 2.0° 6 to 12 GHz ≤ 2.5°	DC to 4 GHz ≥ 40 dB 4 to 6 GHz ≥ 35 dB 6 to 12 GHz ≥ 30 dB	DC to 4 GHz ≥ 35 dB 4 to 6 GHz ≥ 30 dB 6 to 12 GHz ≥ 25 dB
Set components					
	male	**BN 533303R000**	**BN 533305R000**	**BN 533307R000**	**BN 533309R000**
	female	**BN 533304R000**	**BN 533306R000**	**BN 533308R000**	**BN 533310R000**
Option	male-female				**BN 533311R000**

4.1 – 9.5, DC to 12.5 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533827*	4.1 – 9.5	DC to 3 GHz ≤ 0.5° 3 to 6 GHz ≤ 1.0° 6 to 7.5 GHz ≤ 1.5°		DC to 6 GHz ≥ 40 dB 6 to 12.5 GHz ≥ 32 dB	DC to 4 GHz ≥ 35 dB 4 to 6 GHz ≥ 30 dB 6 to 12.5 GHz ≥ 25 dB
Set components					
	male	**BN 533747**	**BN 533745**	**BN 987297**	**BN 983719**
	female	**BN 533746**	**BN 533744**	**BN 987397**	**BN 983720**
Option	male-female				**BN 983721**

* Calibration data in formats for the common VNAs are included in the kit.
It includes individual calibration coefficients for every kit to achieve the best possible performance.

OSLT High Precision Calibration Kits, 50 Ω, Instrument Grade



- High-end S-parameter measurements
- Open, short, load and through (OSLT): each one in male and female version including through adapters, one with male-to-male and one with female-to-female connections
- Optionally a male-to-female is available
- For frequencies from DC to 18 GHz up to DC to 20 GHz

Type N, DC to 18 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533861*	Type N	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.25° 8 to 12 GHz ≤ 1.5° 12 to 18 GHz ≤ 2.0°		DC to 4 GHz ≥ 42 dB 4 to 8 GHz ≥ 38 dB 8 to 12 GHz ≥ 35 dB 12 to 18 GHz ≥ 33 dB	DC to 4 GHz ≥ 38 dB 4 to 8 GHz ≥ 34 dB 8 to 12 GHz ≥ 32 dB 12 to 18 GHz ≥ 28 dB
Set components					
	male	**BN 533914R000**	**BN 533912R000**	**BN 533910R000**	**BN 533916R000**
	female	**BN 533915R000**	**BN 533913R000**	**BN 533911R000**	**BN 533917R000**
Option	male-female				**BN 533918R000**

NEX10®, DC to 20 GHz

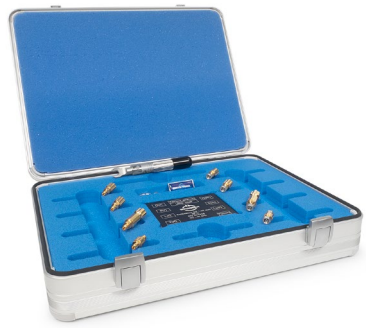
Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 355112*	NEX10®	DC to 4 GHz ≤ 2.0° 4 to 8 GHz ≤ 2.5° 8 to 12 GHz ≤ 3.5° 12 to 20 GHz ≤ 4.5°		DC to 2 GHz ≥ 40 dB 2 to 6 GHz ≥ 34 dB 6 to 12 GHz ≥ 28 dB 12 to 20 GHz ≥ 25 dB	DC to 2 GHz ≥ 34 dB 2 to 6 GHz ≥ 28 dB 6 to 12 GHz ≥ 24 dB 12 to 20 GHz ≥ 20 dB
Set components					
	male	**BN 355103R000**	**BN 355105R000**	**BN 355107R000**	**BN 355109R000**
	female	**BN 355104R000**	**BN 355106R000**	**BN 355108R000**	**BN 355110R000**
Option	male-female				**BN 355111R000**

2.2 – 5, DC to 20 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 225312*	2.2 – 5	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.5° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°		DC to 4 GHz ≥ 40 dB 4 to 8 GHz ≥ 37 dB 8 to 12 GHz ≥ 32 dB 12 to 18 GHz ≥ 30 dB 18 to 20 GHz ≥ 27 dB	DC to 4 GHz ≥ 34 dB 4 to 8 GHz ≥ 31 dB 8 to 12 GHz ≥ 28 dB 12 to 20 GHz ≥ 25 dB
Set components					
	male	**BN 225303R000**	**BN 225305R000**	**BN 225307R000**	**BN 225309R000**
	female	**BN 225304R000**	**BN 225306R000**	**BN 225308R000**	**BN 225310R000**
Option	male-female				**BN 225311R000**

* Calibration data in formats for the common VNAs are included in the kit.
It includes individual calibration coefficients for every kit to achieve the best possible performance.

OSLT High Precision Calibration Kits, 50 Ω, Instrument Grade



- High-end S-parameter measurements
- Open, short, load and through (OSLT): each one in male and female version including through adapters, one with male-to-male and one with female-to-female connections
- Optionally a male-to-female is available
- For frequencies from DC to 32 GHz up to DC to 50 GHz

3.5 mm, DC to 32 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533854*	3.5 mm	DC to 4 GHz ≤ 0.65° 4 to 10 GHz ≤ 1.0° 10 to 26.5 GHz ≤ 2.5° 26.5 to 32 GHz ≤ 3.0°	DC to 4 GHz ≤ 0.5° 4 to 10 GHz ≤ 1.0° 10 to 26.5 GHz ≤ 2.0° 26.5 to 32 GHz ≤ 3.0°	DC to 4 GHz ≥ 35 dB 4 to 10 GHz ≥ 35 dB 10 to 26.5 GHz ≥ 35 dB 26.5 to 32 GHz ≥ 35 dB	DC to 4 GHz ≥ 34 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 32 GHz ≥ 32 dB
Set components					
	male	**BN 533303R000**	**BN 533305R000**	**BN 533307R000**	**BN 533309R000**
	female	**BN 533304R000**	**BN 533306R000**	**BN 533308R000**	**BN 533310R000**
Option	male-female				**BN 533311R000**

2.92 mm, DC to 44 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 534912*	2.92 mm	DC to 4 GHz ≤ 0.75° 4 to 10 GHz ≤ 1.5° 10 to 26.5 GHz ≤ 2.5° 26.5 to 44 GHz ≤ 3.5°	DC to 4 GHz ≤ 0.5° 4 to 10 GHz ≤ 1.0° 10 to 26.5 GHz ≤ 2.0° 26.5 to 44 GHz ≤ 3.0°	DC to 4 GHz ≥ 40 dB 4 to 10 GHz ≥ 34 dB 10 to 26.5 GHz ≥ 30 dB 26.5 to 32 GHz ≥ 28 dB 32 to 40 GHz ≥ 25 dB 40 to 44 GHz ≥ 23 dB	DC to 4 GHz ≥ 33 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 44 GHz ≥ 23 dB
Set components					
	male	**BN 534905R000**	**BN 534903R000**	**BN 534901R000**	**BN 534907R000**
	female	**BN 534906R000**	**BN 534904R000**	**BN 534902R000**	**BN 534908R000**
Option	male-female				**BN 534909R000**

2.4 mm, DC to 50 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533842*	2.4 mm	DC to 26.5 GHz ≤ 1.5° 26.5 to 50 GHz ≤ 2.5°		DC to 4 GHz ≥ 40 dB 4 to 10 GHz ≥ 34 dB 10 to 26.5 GHz ≥ 30 dB 26.5 to 50 GHz ≥ 24 dB	DC to 4 GHz ≥ 32 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 50 GHz ≥ 23 dB
Set components					
	male	**BN 533774R000**	**BN 533772R000**	**BN 533770R000**	**BN 533776R000**
	female	**BN 533775R000**	**BN 533773R000**	**BN 533771R000**	**BN 533777R000**
Option	male-female				**BN 533778R000**

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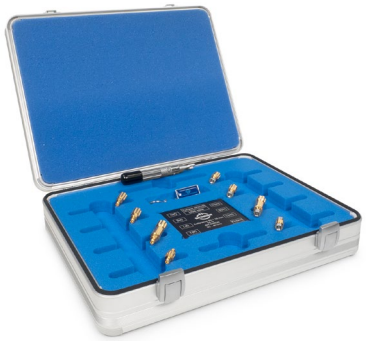
It includes individual calibration coefficients for every kit to achieve the best possible performance.

OSLT High Precision Calibration Kits, 50 Ω, Instrument Grade



- High-end S-parameter measurements
- Open, short, load and through (OSLT): each one in male and female version including through adapters, one with male-to-male and one with female-to-female connections
- Optionally a male-to-female is available
- For frequencies from DC to 70 GHz up to DC to 90 GHz

1.85 mm, DC to 70 GHz

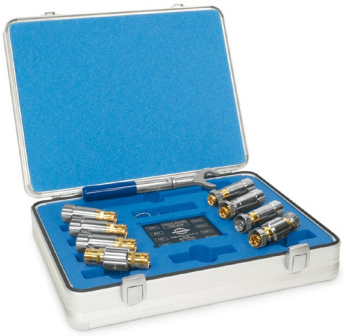
Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 533420*	1.85 mm	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.5° 50 to 70 GHz ≤ 4.5°	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.0° 50 to 70 GHz ≤ 4.0°	DC to 4 GHz ≥ 36 dB 4 to 10 GHz ≥ 31 dB 10 to 26.5 GHz ≥ 25 dB 26.5 to 50 GHz ≥ 22 dB 50 to 67 GHz ≥ 20 dB 67 to 70 GHz ≥ 18 dB	DC to 4 GHz ≥ 32 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 67 GHz ≥ 23 dB 67 to 70 GHz ≥ 21 dB
Set components					
	male	**BN 533425R000**	**BN 533423R000**	**BN 533421R000**	**BN 533427R000**
	female	**BN 533426R000**	**BN 533424R000**	**BN 533422R000**	**BN 533428R000**
Option	male-female				**BN 533429R000**

1.35 mm, DC to 90 GHz

Part Number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 534936*	1.35 mm	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.5° 50 to 70 GHz ≤ 5.0° 70 to 90 GHz ≤ 7.0°	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.0° 50 to 70 GHz ≤ 4.5° 70 to 90 GHz ≤ 6.0°	DC to 4 GHz ≥ 36 dB 4 to 10 GHz ≥ 31 dB 10 to 26.5 GHz ≥ 25 dB 26.5 to 70 GHz ≥ 22 dB 70 to 90 GHz ≥ 20 dB	DC to 4 GHz ≥ 32 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 70 GHz ≥ 23 dB 70 to 90 GHz ≥ 21 dB
Set components					
	male	**BN 534931R000**	**BN 534929R000**	**BN 534927R000**	**BN 534933R000**
	female	**BN 534932R000**	**BN 534930R000**	**BN 534928R000**	**BN 534934R000**
Option	male-female				**BN 534935R000**

* Calibration data in formats for the common VNAs are included in the kit.
It includes individual calibration coefficients for every kit to achieve the best possible performance.

OSLT High Precision Calibration Kits, 75 Ω, Instrument Grade



- High-end S-parameter measurements
- Open, short, load and through (OSLT): each one in male and female version including through adapters, one with male-to-male and one with female-to-female connections
- Optionally a male-to-female is available
- For frequencies from DC to 18 GHz
- N 75 is a 75 Ohm interface not intermateable with Type N (50 Ohm) versions

Type N-75, DC to 18 GHz

Part number	Interface	Open Phase deviation, max.	Short Phase deviation, max.	Load Return loss, min.	Through Return loss, min.
BN 534046*	Type N	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.5° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°		DC to 4 GHz ≥ 38 dB 4 to 8 GHz ≥ 34 dB 8 to 12 GHz ≥ 30 dB 12 to 20 GHz ≥ 25 dB	DC to 4 GHz ≥ 35 dB 4 to 8 GHz ≥ 31 dB 8 to 12 GHz ≥ 28 dB 12 to 20 GHz ≥ 23 dB
Set components					
	male	**BN 534061R000**	**BN 534063R000**	**BN 534065R000**	**BN 534067R000**
	female	**BN 534062R000**	**BN 534064R000**	**BN 534066R000**	**BN 534068R000**
Option	male-female				**BN 534069R000**

* Calibration data in formats for the common VNAs are included in the kit.
It includes individual calibration coefficients for every kit to achieve the best possible performance.

Precision OPEN, 50 Ω, Instrument Grade

BN 533774R000

BN 5337675R001

- Contoured end cap fits to spanner SW 8 as well
- Calibration certificate included

Part Number	Interface	Frequency Range	Phase Deviation, max.
BN 806405R000 BN 806505R000	7 – 16 male 7 – 16 female	DC to 7.5 GHz	DC to 3 GHz ≤ 0.5° 3 to 6 GHz ≤ 1.0° 6 to 7.5 GHz ≤ 1.5°
BN 533303R000 BN 533304R000	4.3 – 10 male 4.3 – 10 female	DC to 12 GHz	DC to 3 GHz ≤ 0.5° DC to 4 GHz ≤ 1.5° 4 to 6 GHz ≤ 2.5° 6 to 12 GHz ≤ 3.0°
BN 533747 BN 533746	4.1 – 9.5 male 4.1 – 9.5 female	DC to 12.5 GHz	see calibration data
BN 533914R000 BN 533915R000	Type N male Type N female	DC to 18 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.25° 8 to 12 GHz ≤ 1.5° 12 to 18 GHz ≤ 2.0°
BN 355103R000 BN 355104R000	NEX10® male NEX10® female	DC to 20 GHz	DC to 4 GHz ≤ 2.0° 4 to 8 GHz ≤ 2.5° 8 to 12 GHz ≤ 3.5° 12 to 20 GHz ≤ 4.5°
BN 225303R000 BN 225304R000	2.2 – 5 male 2.2 – 5 female	DC to 20 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.5° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°
BN 533764R000 BN 533763R000	3.5 mm male 3.5 mm female	DC to 32 GHz	DC to 4 GHz ≤ 0.65° 4 to 10 GHz ≤ 1.0° 10 to 26.5 GHz ≤ 2.5° 26.5 to 32 GHz ≤ 3.0°
BN 534905R000 BN 534906R000	2.92 mm male 2.92 mm female	DC to 44 GHz	DC to 4 GHz ≤ 0.75° 4 to 10 GHz ≤ 1.5° 10 to 26.5 GHz ≤ 2.5° 26.5 to 44 GHz ≤ 3.5°
BN 533774R000 BN 533775R000	2.4 mm male 2.4 mm female	DC to 50 GHz	DC to 26.5 GHz ≤ 1.5° 26.5 to 50 GHz ≤ 2.5°
BN 533425R000 BN 533426R000	1.85 mm male 1.85 mm female	DC to 70 GHz	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.5° 50 to 70 GHz ≤ 4.5°
BN 534931R000 BN 534932R000	1.35 mm male 1.35 mm female	DC to 90 GHz	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.5° 50 to 70 GHz ≤ 5.0° 70 to 90 GHz ≤ 7.0°

Precision SHORT, 50 Ω, Instrument Grade

BN 533744

BN 533745

- Contoured end cap fits to spanner SW 8 as well
- Calibration certificate included

Part Number	Interface	Frequency Range	Phase Deviation, max.
BN 806404R000 BN 806404R000	7 – 16 male 7 – 16 female	DC to 7.5 GH	DC to 3 GHz ≤ 0.5° 3 to 6 GHz ≤ 1.0° 6 to 7.5 GHz ≤ 1.5°
BN 533305R000 BN 533306R000	4.3 – 10 male 4.3 – 10 female	DC to 12 GHz	DC to 4 GHz ≤ 1.0° 4 to 6 GHz ≤ 2.0° 6 to 12 GHz ≤ 2.5°
BN 533745 BN 533744	4.1 – 9.5 male 4.1 – 9.5 female	DC to 12.5 GHz	see calibration data
BN 533912R000 BN 533913R000	Type N male Type N female	DC to 18 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.25° 8 to 12 GHz ≤ 1.5° 12 to 18 GHz ≤ 2.0°
BN 355105R000 BN 355106R000	NEX10® male NEX10® female	DC to 20 GHz	DC to 4 GHz ≤ 2.0° 4 to 8 GHz ≤ 2.5° 8 to 12 GHz ≤ 3.5° 12 to 20 GHz ≤ 4.5°
BN 225305R000 BN 225306R000	2.2 – 5 male 2.2 – 5 female	DC to 20 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.25° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°
BN 533762R000 BN 533761R000	3.5 mm male 3.5 mm female	DC to 32 GHz	DC to 4 GHz ≤ 0.5° 4 to 10 GHz ≤ 1.0° 10 to 26.5 GHz ≤ 2.0° 26.5 to 32 GHz ≤ 3.0°
BN 534903R000 BN 534904R000	2.92 mm male 2.92 mm female	DC to 44 GHz	DC to 4 GHz ≤ 0.5° 4 to 10 GHz ≤ 1.0° 10 to 26.5 GHz ≤ 2.0° 26.5 to 44 GHz ≤ 3.0°
BN 533772R000 BN 533773R000	2.4 mm male 2.4 mm female	DC to 50 GHz	DC to 26.5 GHz ≤ 1.5° 26.5 to 50 GHz ≤ 2.5°
BN 533423R000 BN 533424R000	1.85 mm male 1.85 mm female	DC to 70 GHz	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.0° 50 to 70 GHz ≤ 4.0°
BN 534929R000 BN 534930R000	1.35 mm male 1.35 mm female	DC to 90 GHz	DC to 26.5 GHz ≤ 2.0° 26.5 to 50 GHz ≤ 3.5° 50 to 70 GHz ≤ 4.5° 70 to 90 GHz ≤ 6.0°

Precision LOAD, 50 Ω, Instrument Grade

BN 533107

BN 533108

- Contoured end cap fits to spanner SW 8 as well
- Calibration certificate included

Part Number	Interface	Frequency Range	Return Loss, min.
BN 533732R000 BN 533733R000	7 – 16 male 7 – 16 female	DC to 7.5 GHz	DC to 7.5 GHz ≥ 44 dB
BN 533307R000 BN 533308R000	4.3 – 10 male 4.3 – 10 female	DC to 12 GHz	DC to 4 GHz ≥ 40 dB 4 to 6 GHz ≥ 35 dB 6 to 12 GHz ≥ 30 dB
BN 987297 BN 987397	4.1 – 9.5 male 4.1 – 9.5 female	DC to 12.5 GHz	DC to 6 GHz ≥ 40 dB 6 to 12.5 GHz ≥ 32 dB
BN 533910R000 BN 533911R000	Type N male Type N female	DC to 18 GHz	DC to 4 GHz ≥ 42 dB 4 to 8 GHz ≥ 38 dB 8 to 12 GHz ≥ 35 dB 12 to 18 GHz ≥ 33 dB
BN 355107R000 BN 355108R000	NEX10® male NEX10® female	DC to 20 GHz	DC to 2 GHz ≥ 40 dB 2 to 6 GHz ≥ 34 dB 6 to 12 GHz ≥ 28 dB 12 to 20 GHz ≥ 25 dB
BN 225307R000 BN 225308R000	2.2 – 5 male 2.2 – 5 female	DC to 20 GHz	DC to 4 GHz ≥ 40 dB 4 to 8 GHz ≥ 37 dB 8 to 12 GHz ≥ 32 dB 12 to 18 GHz ≥ 30 dB 18 to 20 GHz ≥ 27 dB
BN 533766R000 BN 533765R000	3.5 mm male 3.5 mm female	DC to 32 GHz	DC to 4 GHz ≥ 40 dB 4 to 10 GHz ≥ 34 dB 10 to 26.5 GHz ≥ 30 dB 26.5 to 32 GHz ≥ 28 dB
BN 534903R000 BN 534904R000	2.92 mm male 2.92 mm female	DC to 44 GHz	DC to 4 GHz ≥ 40 dB 4 to 10 GHz ≥ 34 dB 10 to 26.5 GHz ≥ 30 dB 26.5 to 32 GHz ≥ 28 dB 32 to 40 GHz ≥ 25 dB 40 to 44 GHz ≥ 23 dB
BN 533770R000 BN 533771R000	2.4 mm male 2.4 mm female	DC to 50 GHz	DC to 4 GHz ≥ 40 dB 4 to 10 GHz ≥ 34 dB 10 to 26.5 GHz ≥ 30 dB 26.5 to 50 GHz ≥ 24 dB
BN 533421R000 BN 533422R000	1.85 mm male 1.85 mm female	DC to 70 GHz	DC to 4 GHz ≥ 36 dB 4 to 10 GHz ≥ 31 dB 10 to 26.5 GHz ≥ 25 dB 26.5 to 50 GHz ≥ 22 dB 50 to 67 GHz ≥ 20 dB 67 to 70 GHz ≥ 18 dB
BN 534927R000 BN 534928R000	1.35 mm male 1.35 mm female	DC to 90 GHz	DC to 4 GHz ≥ 36 dB 4 to 10 GHz ≥ 31 dB 10 to 26.5 GHz ≥ 25 dB 26.5 to 70 GHz ≥ 22 dB 70 to 90 GHz ≥ 20 dB

Precision THROUGH, 50 Ω, Instrument Grade

BN 355109

- Contoured end cap fits to spanner SW 8 as well
- Calibration certificate included

Part number	Interface	Frequency Range	Return loss, min.
BN 393307R000 BN 196404R000 BN 756301R000	7 – 16 male 7 – 16 female 7 – 16 male/female	DC to 7.5 GHz	DC to 4 GHz ≥ 40 dB 4 to 7.5 GHz ≥ 36 dB
BN 533309R000 BN 533310R000 BN 533311R000	4.3 – 10 male 4.3 – 10 female 4.3 – 10 male/female	DC to 12 GHz	DC to 4 GHz ≥ 35 dB 4 to 6 GHz ≥ 30 dB 6 to 12 GHz ≥ 25 dB
BN 983719 BN 983720 BN 983721	4.1 – 9.5 male 4.1 – 9.5 female 4.1 – 9.5 male/female	DC to 12.5 GHz	DC to 4 GHz ≥ 35 dB 4 to 6 GHz ≥ 30 dB 6 to 12.5 GHz ≥ 25 dB
BN 533916R000 BN 533917R000 BN 533918R000	Type N male Type N female Type N male/female	DC to 18 GHz	DC to 4 GHz ≥ 38 dB 4 to 8 GHz ≥ 34 dB 8 to 12 GHz ≥ 32 dB 12 to 18 GHz ≥ 28 dB
BN 355109R000 BN 355110R000 BN 355111R000	NEX10® male NEX10® female NEX10® male/female	DC to 20 GHz	DC to 2 GHz ≥ 34 dB 2 to 6 GHz ≥ 28 dB 6 to 12 GHz ≥ 24 dB 12 to 20 GHz ≥ 20 dB
BN 225309R000 BN 225310R000 BN 225311R000	2.2 – 5 male 2.2 – 5 female 2.2 – 5 male/female	DC to 20 GHz	DC to 4 GHz ≥ 34 dB 4 to 8 GHz ≥ 31 dB 8 to 12 GHz ≥ 28 dB 12 to 20 GHz ≥ 25 dB
BN 533767R000 BN 533768R000 BN 533769R000	3.5 mm male 3.5 mm female 3.5 mm male/female	DC to 32 GHz	DC to 4 GHz ≥ 34 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 32 GHz ≥ 32 dB
BN 534907R000 BN 534908R000 BN 534909R000	2.92 mm male 2.92 mm female 2.92 mm male/female	DC to 44 GHz	DC to 4 GHz ≥ 33 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 44 GHz ≥ 23 dB
BN 533776R000 BN 533777R000 BN 533778R000	2.4 mm male 2.4 mm female 2.4 mm male/female	DC to 50 GHz	DC to 4 GHz ≥ 32 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 50 GHz ≥ 23 dB
BN 533427R000 BN 533428R000 BN 533429R000	1.85 mm male 1.85 mm female 1.85 mm male/female	DC to 70 GHz	DC to 4 GHz ≥ 32 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 67 GHz ≥ 23 dB 67 to 70 GHz ≥ 21 dB
BN 534933R000 BN 534934R000 BN 534935R000	1.35 mm male 1.35 mm female 1.35 mm male/female	DC to 90 GHz	DC to 4 GHz ≥ 32 dB 4 to 26.5 GHz ≥ 30 dB 26.5 to 40 GHz ≥ 25 dB 40 to 70 GHz ≥ 23 dB 70 to 90 GHz ≥ 21 dB

Precision OPEN, 75 Ω, Instrument Grade

Part Number	Interface	Frequency Range	Phase Deviation, max.
BN 534061R000 **BN 534062R000**	Type N 75 Ohm male Type N 75 Ohm female	DC to 20 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.5° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°

Precision SHORT, 75 Ω, Production Grade

Part number	Interface	Frequency Range	Phase Deviation, max.
BN 876785	Type N 75 Ohm male	DC to 3 GHz	DC to 3 GHz ≤ 1.5°

Precision SHORT, 75 Ω, Instrument Grade

Part Number	Interface	Frequency Range	Phase Deviation, max.
BN 534063R000 **BN 534064R000**	Type N male Type N female	DC to 20 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.5° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°

Precision LOAD, 75 Ω, Production Grade

Part Number	Interface	Frequency Range	Return Loss, min.
BN 876784	Type N male	DC to 3 GHz	DC to 3 GHz ≤ 1.5°

Precision LOAD, 75 Ω, Instrument Grade

Part Number	Interface	Frequency Range	Return Loss, min.
BN 534065R000	Type N 75 Ohm male	DC to 20 GHz	DC to 4 GHz ≤ 35 dB 4 to 8 GHz ≤ 31 dB 8 to 12 GHz ≤ 28 dB 12 to 20 GHz ≤ 23 dB
BN 534066R000	Type N 75 Ohm female		

Precision THROUGH, 75 Ω, Instrument Grade

Part Number	Interface	Frequency Range	Phase Deviation, max.
BN 534067R000	Type N 75 Ohm male	DC to 20 GHz	DC to 4 GHz ≤ 1.0° 4 to 8 GHz ≤ 1.5° 8 to 12 GHz ≤ 2.0° 12 to 20 GHz ≤ 3.0°
BN 534068R000	Type N 75 Ohm female		
BN 534069R000	Type N 75 Ohm male-female		

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HIGH FREQUENCY PERFORMANCE WORLDWIDE

SPINNER designs and builds cutting-edge radio frequency systems, setting performance and longevity standards for others to follow. The company's track record of innovation dates back to 1946, and many of today's mainstream products are rooted in SPINNER inventions.

Industry leaders continue to count on SPINNER's engineering excellence to drive down their costs of service and ownership with premium-quality, off-the-shelf products and custom solutions. Headquartered in Munich, Germany, the global frontrunner in RF components remains the first choice in simple-yet-smart RF solutions.

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