Agilent 85046A/B and 85047A Solid-State Switching S-Parameter Test Sets

Data Sheet

300 kHz to 6 GHz

New test sets for the Agilent 8753 network analyzer family

Solid-state test port switches are standard for the Agilent 85046A/B and 85047A S-Parameter Test Sets. These new test sets improve the speed, accuracy and ease of RF component measurements with the 8753.

With the 8753 Network Analyzer, these test sets comprise a complete system for measuring the magnitude, phase and group delay response of RF components in the 300 kHz to 6 GHz frequency range.

There are three S-Parameter test sets in the 8753 family. The 85046A is a 50-ohm model that operates from 300 kHz to 3 GHz. The 85046B is a 75-ohm version that covers the frequency range of 300 kHz to 2 GHz. The 85047A is a 50-ohm test set that extends the frequency range to 6 GHz.

Faster, more accurate S-parameter measurements

Improve the speed and accuracy of your S-Parameter measurements with a solid-state switching test set. These new test sets provide faster, more accurate measurements by continuously updating all four S-Parameters when a full two-port error correction is used. Measurement speed is improved by 160 milliseconds each time the trace is updated for sweeps with 101 points or more.

Measure forward and reverse parameters simultaneously

Solid-state switching allows the selection of any two S-Parameters, both continuously updated, on the display. For example, when adjusting the bias of an amplifier, it is often required to simultaneously monitor the forward gain and output match. Mechanical versions of the 85046A/B and 85047A test sets will update either forward or reverse parameters continuously but not a combination of both.

Simplify tuning procedures

Solid-state switching is ideal for use in tuning applications where all four S-Parameters are changing. It is no longer necessary to press MEASURE RESTART when using a full two-port error correction. All four S-Parameters are being continuously measured.

Improved reliability for automatic measurement systems

Solid-state switches have no mechanical parts, and therefore will not wear out in a continuously measuring automatic test system. Mechanical test set switches (Option 009) typically have a lifetime in excess of three million cycles. The solid-state switches will typically extend the lifetime indefinitely.

Achieve the highest system accuracy with faster measurement speeds

The specifications listed in the table and the typical measurement uncertainties shown below apply to all Agilent 8753C systems using either solid-state switching (standard) or mechanical (Option 009) versions of the test sets.

Test set specifications

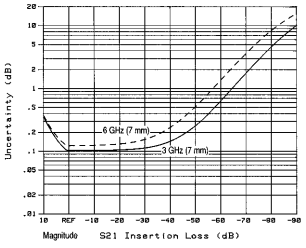
Specifications describe the instrument's warranted performance over the temperature range 0 to +55˚C (except where noted).

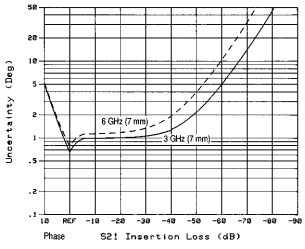
Parameter	85046A (50 Ω)	85046B (75 Ω)	85047A (50 Ω)
Frequency Range:	300 kHz to 3 GHz	300 kHz to 2 GHz	300 kHz to 3 GHz/3 MHz to 6 GHz
Directivity[1] Port 1, 2:	≥35 dB: 300 kHz to 1.3 GHz ≥30 dB: 1.3 GHz to 3 GHz	≥35 dB: 300 kHz to 1.3 GHz ≥30 dB: 1.3 GHz to 2 GHz	≥35 dB: 300 kHz to 1.3 GHz ≥30 dB: 1.3 GHz to 3 GHz ≥25 dB: 3 GHz to 6 GHz
Effective Source Match[1]:	≥14 dB: 300 kHz to 2 MHz ≥20 dB: 2 MHz to 1.3 GHz ≥16 dB: 1.3 GHz to 3 GHz	≥14 dB: 300 kHz to 2 MHz ≥17 dB: 2 MHz to 1.3 GHz ≥16 dB: 1.3 GHz to 2 GHz	≥20 dB: 300 kHz to 1.3 GHz ≥16 dB: 1.3 GHz to 3 GHz ≥14 dB: 3 GHz to 6 GHz
Switch Repeatability:		±0.03 dB	

8753C System measurement uncertainty[2]

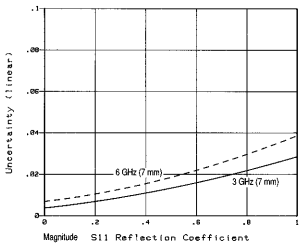
The graphs below show the typical measurement uncertainty for the 8753C using full 2-port error correction with the Agilent 85031B 7-mm Calibration Kit.

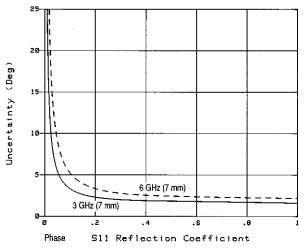
Transmission measurements[3]





Reflection measurements[4]





1. Can be greatly improved by accuracy enhancement techniques.
2. These measurement uncertainty curves utilize an RSS model for the contributions of random errors, and a worst-case model for the contributions of dynamic accuracy and residual systematic errors.
3. The graphs shown for transmission measurements assume a well-matched device (S11=S22=0).
4. The graphs for reflection measurement uncertainty apply to either a one-port device or a two-port device with more than 6 dB of insertion loss.

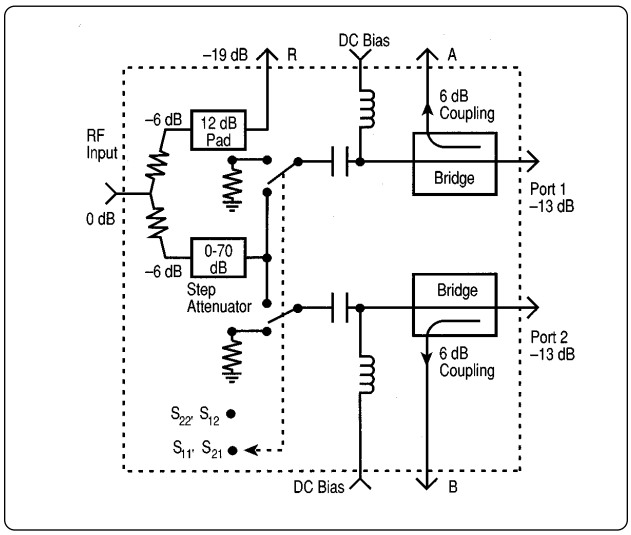
Supplemental characteristics

Supplemental characteristics are intended to provide information useful in applying the instrument by giving typical but non-warranted performance parameters. These are denoted as “typical”, “nominal”, or “approximate”.

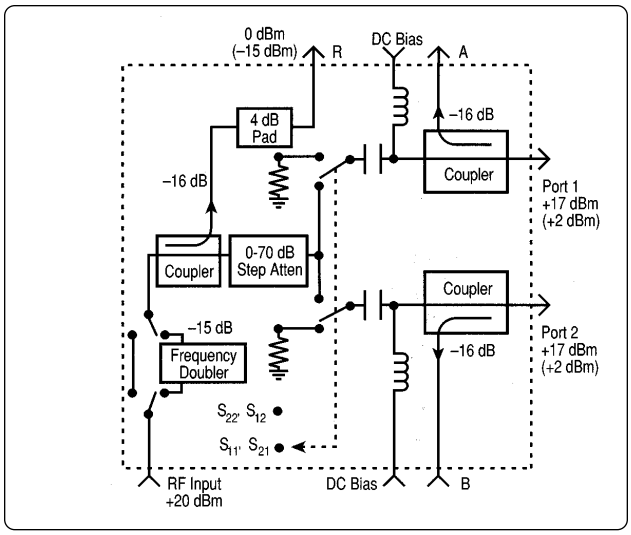
Key performance parameters for these test sets are listed in the table. Standard (solid-state) and Option 009 (mechanical) test sets have identical performance except where noted below. Further, these performance differences only affect the measurement uncertainties of an “uncorrected” 8753C network analyzer system.

Parameter	85046A	85046B	85047A
Transmission Tracking[1]:			
Magnitude[5]:			
Standard:	±1.5 dB	±1.5 dB	±2 dB
Option 009:	±1.5 dB	±1.5 dB	±1.5 dB
Phase[6]:	±20 deg: 300 kHz to 2 MHz ±10 deg: 2 MHz to 3 GHz	±20 deg: 300 kHz to 2 MHz ±10 deg: 2 MHz to 2 GHz	±10 deg: 300 kHz to 3 GHz ±20 deg: 3 GHz to 6 GHz
Reflection Tracking[1]:			
Magnitude[5]:			
Standard:	±1.5 dB	±1.5 dB	±2 dB
Option 009:	±1.5 dB	±1.5 dB	±1.5 dB
Phase[6]:	±25 deg: 300 kHz to 2 MHz ±10 deg: 2 MHz to 3 GHz	±25 deg: 300 kHz to 2 MHz ±10 deg: 2 MHz to 2 GHz	±10 deg: 300 kHz to 3 GHz ±20 deg: 3 GHz to 6 GHz
Nominal Insertion Loss:			
RF IN to Port 1, 2:			
Standard:	14 dB +0.5 dB/GHz	19.5 dB +1 dB/GHz	4 dB +0.8 dB/GHz: 300 kHz to 3 GHz 17.5 dB +0.8 dB/GHz: 3 GHz to 6 GHz
Option 009:	12.5 dB +0.5 dB/GHz	18 dB +1 dB/GHz	2.5 dB +0.5 dB/GHz: 300 kHz to 3 GHz 16 dB +0.5 dB/GHz: 3 GHz to 6 GHz
RF IN to R:	18 dB +1.5 dB/GHz	18 dB +1.5 dB/GHz	19 dB +0.5 dB/GHz: 300 kHz to 3 GHz 34 dB +0.5 dB/GHz: 3 GHz to 6 GHz
Typical Isolation between Port 1 and 2:	100 dB	100 dB	100 dB: 300 kHz to 3 GHz 90 dB: 3 GHz to 6 GHz
Nominal Impedance:			
Port 1, 2:	50 Ω Nominal	75 Ω Nominal	50 Ω Nominal
RF IN, R, A, B:	50 Ω Nominal	50 Ω Nominal	50 Ω Nominal
DC bias input range:	+30 VDC, ±200 mA with some degradation in RF specifications (±500 mA maximum)		+30 VDC, ±200 mA with no degradation in RF specifications (±1 A maximum)
Connectors:			
Port 1, 2:	7 mm	75 Ω Type-N(f)	7 mm
RF IN, R, A, B:	50 Ω Type-N(f)	50 Ω Type-N(f)	50 Ω Type-N(f)
DC bias input:	BNC(f)	BNC(f)	BNC(f)

5. Deviation from mean value.
6. Deviation from linear phase.



Agilent 85046A/B schematic



Agilent 85047A schematic

Ordering summary

85046A	50-ohm S-parameter test set
Option 009	Substitute mechanical test port switch
85046B	75-ohm S-parameter test set
Option 009	Substitute mechanical test port switch
85047A	50-ohm S-parameter test set (6 GHz)
Option 009	Substitute mechanical test port switch

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