8505xG Data-Based Mechanical Calibration Kit

85050G 7 mm, 18 GHz
85054G Type-N, 18 GHz
85052G 3.5 mm, 33 GHz
85055G 2.92 mm, 44 GHz
85056G 2.4 mm, 50 GHz
85058G 1.85 mm, 67 GHz

Introduction

Keysight's 8505xG Data-based mechanical calibration kits are designed exclusively for Keysight vector network analyzers and for calibrating network analyzer measurement setups. The 8505xG calibration kits use new data-based models and provide better directivity performance than traditional mechanical calibration using polynomial models.

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8505xG using Generalized Data-Based Models

Keysight's traditional mechanical calibration kits use polynomial models. The 8505xG Data-based mechanical calibration kits employ new data-based models. The 8505xG calibration kit without option CDA uses new generalized data-based models, and the performance is equivalent or slightly better than the 8505xD/E economy mechanical calibration kits. The maximum frequency of the 85052D 3.5 mm calibration kit is limited to 26.5 GHz, but the new 85052G 3.5 mm calibration kit extends the operation frequency to 33 GHz.

8505xG with Option CDA using serialized data-based models enhances the performance of the 8505xG calibration kits. The 8505xG with Option CDA comes with characterized data specific to the serial number of the calibration kit, and the performance is equivalent or better than the 8505xA/B standard mechanical calibration kits. The 8505xA/Bs and the 85056KE01 standard calibration kit include sliding loads to achieve better performance but it is cumbersome to connect and use the sliding loads. The new 8505xG calibration kits do not include sliding loads, which eliminates the hassle, and achieve equivalent or better performance than the standard calibration kit with only open, short and fixed load standards.

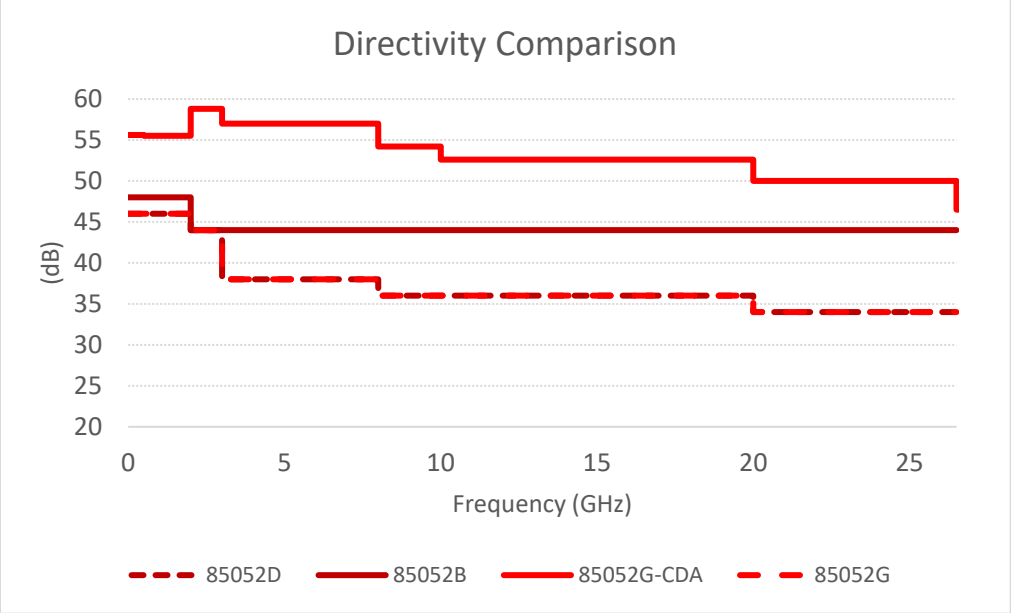

Figure 1. Directivity Comparison between 85052B Standard cal kit, 85052D Economy cal kit and 85052G data-based cal kit with and without Option CDA.

Specifications

One of the parameters in the tables below, Magnitude Deviation, is the log magnitude of the vector difference between the current reflection coefficient characterization and the prior reflection coefficient characterization. Magnitude Deviation = $20 * \log_{10} | \Gamma_{current} - \Gamma_{prior} |$

85050G 7 mm Data-Based Mechanical Calibration Kit

Device	Frequency (GHz)	Parameter	Specification	
Broadband load	DC to ≤ 18	Return Loss	≥ 38 dB	≤0.01259 (Lin Mag)
Open with collet pusher	DC to ≤ 2	Deviation from Nominal Phase	±0.3°	
	> 2 to ≤ 8	Deviation from Nominal Phase	±0.4°	
	> 8 to ≤18	Deviation from Nominal Phase	±0.6°	
Offset Short	DC to ≤ 2	Deviation from Nominal Phase	±0.2°	
	> 2 to ≤ 8	Deviation from Nominal Phase	±0.3°	
	> 8 to ≤ 18	Deviation from Nominal Phase	±0.5°	

85050G 7 mm Data-Based Mechanical Calibration Kit with Option CDA (Characterized Data-Based)

Device	Frequency (GHz)	Parameter	Specification	
Broadband load	DC to ≤ 15	Magnitude Deviation	≤ -53 dB	≤0.00224 (Lin Mag)
	> 15 to ≤ 18	Magnitude Deviation	≤ -49 dB	≤0.00355 (Lin Mag)
Open with collet pusher	DC to ≤ 2	Deviation from Nominal Phase	±0.3°	
	> 2 to ≤ 8	Deviation from Nominal Phase	±0.4°	
	> 8 to ≤18	Deviation from Nominal Phase	±0.6°	
Offset Short	DC to ≤ 2	Deviation from Nominal Phase	±0.2°	
	> 2 to ≤ 8	Deviation from Nominal Phase	±0.3°	
	> 8 to ≤ 18	Deviation from Nominal Phase	±0.5°	

85054G Type-N Data-Based Mechanical Calibration Kit

Device	Frequency (GHz)	Parameter	Specification (Male and Female)	
Broadband loads	DC to ≤ 2	Return Loss	≥ 40 dB	≤0.01000 (Lin Mag)
	> 2 to ≤ 8	Return Loss	≥ 36 dB	≤0.01585 (Lin Mag)
	> 8 to ≤ 18	Return Loss	≥ 34 dB	≤0.01995 (Lin Mag)
Adapters	DC to ≤ 8	Return Loss	≥ 34 dB	≤0.01995 (Lin Mag)
	> 8 to ≤ 18	Return Loss	≥ 28 dB	≤0.03981 (Lin Mag)
Offset Opens	DC to ≤ 18	Deviation from Nominal Phase	±1.5°	
Offset Shorts	DC to ≤ 18	Deviation from Nominal Phase	±.1.0°	

85054G Type-N Data-Based Mechanical Calibration Kit with Option CDA (Characterized Data-Based)

Device	Frequency (GHz)	Parameter	Specification (Male and Female)	
Broadband loads	DC to ≤ 2	Magnitude Deviation	≤ -48 dB	≤0.00398 (Lin Mag)
	> 2 to ≤ 18	Magnitude Deviation	≤ -42 dB	≤0.00794 (Lin Mag)
Offset Opens	DC to ≤ 18	Deviation from Nominal Phase	±1.5°	
Offset Shorts	DC to ≤ 18	Deviation from Nominal Phase	±.1.0°	

85052G 3.5 mm Data-Based Mechanical Calibration Kit

Device	Frequency (GHz)	Parameter	Specification (Male and Female)	
Broadband loads	DC to ≤ 2	Return Loss	≥ 46 dB	≤0.00501 (Lin Mag)
	> 2 to ≤ 3	Return Loss	≥ 44 dB	≤0.00631 (Lin Mag)
	> 3 to ≤ 8	Return Loss	≥ 38 dB	≤0.01259 (Lin Mag)
	> 8 to ≤ 20	Return Loss	≥ 36 dB	≤0.01585 (Lin Mag)
	> 20 to ≤ 26.5	Return Loss	≥ 34 dB	≤0.01995 (Lin Mag)
	> 26.5 to ≤ 33	Return Loss	≥ 28 dB	≤0.03981 (Lin Mag)
Adapters	DC to ≤ 8	Return Loss	≥ 30 dB	≤0.03162 (Lin Mag)
	> 8 to ≤ 18	Return Loss	≥ 28 dB	≤0.03981 (Lin Mag)
	> 18 to ≤ 30	Return Loss	≥ 26 dB	≤0.05012 (Lin Mag)
	> 30 to ≤ 33	Return Loss (Typical)	≥ 26 dB	≤0.05012 (Lin Mag)
Offset opens	DC to ≤ 3	Deviation from Nominal Phase	±0.65°	
	> 3 to ≤ 8	Deviation from Nominal Phase	±1.2°	
	> 8 to ≤ 26.5	Deviation from Nominal Phase	±2.0°	
	> 26.5 to ≤ 33	Deviation from Nominal Phase	±3.0°	
Offset shorts	DC to ≤ 3	Deviation from Nominal Phase	±0.5°	
	> 3 to ≤ 8	Deviation from Nominal Phase	±1.0°	
	> 8 to ≤ 26.5	Deviation from Nominal Phase	±1.75°	
	> 26.5 to ≤ 33	Deviation from Nominal Phase	±2.65°	

85052G 3.5 mm Data-Based Mechanical Calibration Kit with Option CDA (Characterized Data-Based)

Device	Frequency (GHz)	Parameter	Specification (Male and Female)
Broadband loads	DC to ≤ 33	Magnitude Deviation	≤ -53 dB to ≤ -45 dB Fitted Line[1]: ≤ -53 dB + (0.2424 dB/GHz) × f
Offset opens	DC to ≤ 3	Deviation from Nominal Phase	±0.65°
	> 3 to ≤ 8	Deviation from Nominal Phase	±1.2°
	> 8 to ≤ 26.5	Deviation from Nominal Phase	±2.0°
	> 26.5 to ≤ 33	Deviation from Nominal Phase	±3.0°
Offset shorts	DC to ≤ 3	Deviation from Nominal Phase	±0.5°
	> 3 to ≤ 8	Deviation from Nominal Phase	±1.0°
	> 8 to ≤ 26.5	Deviation from Nominal Phase	±1.75°
	> 26.5 to ≤ 33	Deviation from Nominal Phase	±2.65°

1. Fitted line is in dB, dependent variable f is frequency in GHz.

85055G 2.92 mm Data-Based Mechanical Calibration Kit

Device	Frequency (GHz)	Parameter	Specification	
Broadband loads	DC to ≤ 4	Return Loss	≥ 40 dB	≤0.01000 (Lin Mag)
	> 4 to ≤ 10	Return Loss	≥ 34 dB	≤0.01995 (Lin Mag)
	> 10 to ≤ 26.5	Return Loss	≥ 30 dB	≤0.03162 (Lin Mag)
	> 26.5 to ≤ 32	Return Loss	≥ 28 dB	≤0.03981 (Lin Mag)
	> 32 to ≤ 40	Return Loss	≥ 25 dB	≤0.05623 (Lin Mag)
	> 40 to ≤ 44	Return Loss	≥ 23 dB	≤0.07079 (Lin Mag)
Adapters	DC to ≤ 4	Return Loss	≥ 33 dB	≤0.02239 (Lin Mag)
	> 4 to ≤ 26.5	Return Loss	≥ 30 dB	≤0.03162 (Lin Mag)
	> 26.5 to ≤ 40	Return Loss	≥ 25 dB	≤0.05623 (Lin Mag)
	> 40 to ≤ 44	Return Loss	≥ 23 dB	≤0.07079 (Lin Mag)
Offset opens	DC to ≤ 4	Deviation from Nominal Phase	±0.75°	
	> 4 to ≤ 40	Deviation from Nominal Phase	±1.5°	
	> 40 to ≤ 44	Deviation from Nominal Phase	±2.5°	
Offset shorts	DC to ≤ 4	Deviation from Nominal Phase	±0.5°	
	> 4 to ≤ 10	Deviation from Nominal Phase	±1.0°	
	> 10 to ≤ 40	Deviation from Nominal Phase	±2.0°	
	> 40 to ≤ 44	Deviation from Nominal Phase	±2.5°	

85055G 2.92 mm Data-Based Mechanical Calibration Kit with Option CDA (Characterized Data-Based)

Device	Frequency (GHz)	Parameter	Specification (Male)	Specification (Female)
Broadband loads	DC to ≤ 44	Magnitude Deviation	≤ -48 dB to ≤ -39 dB Fitted Line[1]: ≤−48 dB + (0.20454 dB/GHz) × f	≤ -47 dB to ≤ -40 dB Fitted Line[1]: ≤−47 dB + (0.15909 dB/GHz) × f
Offset opens	DC to ≤ 4	Deviation from Nominal Phase	±0.75°	±0.75°
	> 4 to ≤ 40	Deviation from Nominal Phase	±1.5°	±1.5°
	> 40 to ≤ 44	Deviation from Nominal Phase	±2.5°	±2.5°
Offset shorts	DC to ≤ 4	Deviation from Nominal Phase	±0.5°	±0.5°
	> 4 to ≤ 10	Deviation from Nominal Phase	±1.0°	±1.0°
	> 10 to ≤ 40	Deviation from Nominal Phase	±2.0°	±2.0°
	> 40 to ≤ 44	Deviation from Nominal Phase	±2.5°	±2.5°

1. Fitted line is in dB, dependent variable f is frequency in GHz.

85056G 2.4 mm Data-Based Mechanical Calibration Kit

Device	Frequency (GHz)	Parameter	Specification (Male and Female)	
Broadband loads	DC to ≤ 4	Return Loss	≥ 42 dB	≤ 0.00794 (Lin Mag)
	> 4 to ≤ 20	Return Loss	≥ 34 dB	≤ 0.01995 (Lin Mag)
	> 20 to ≤ 26.5	Return Loss	≥ 30 dB	≤ 0.03162 (Lin Mag)
	> 26.5 to ≤ 50	Return Loss	≥ 26 dB	≤ 0.05012 (Lin Mag)
Adapters	DC to ≤ 4	Return Loss	≥ 32 dB	≤ 0.02512 (Lin Mag)
	> 4 to ≤ 26.5	Return Loss	≥ 30 dB	≤ 0.03162 (Lin Mag)
	> 26.5 to ≤ 40	Return Loss	≥ 25 dB	≤ 0.05623 (Lin Mag)
	> 40 to ≤ 50	Return Loss	≥ 20 dB	≤ 0.10000 (Lin Mag)
Offset opens	DC to ≤ 2	Deviation from Nominal Phase	±0.5°	
	> 2 to ≤ 20	Deviation from Nominal Phase	±1.25°	
	> 20 to ≤ 40	Deviation from Nominal Phase	±1.75°	
	> 40 to ≤ 50	Deviation from Nominal Phase	±2.25°	
Offset shorts	DC to ≤ 2	Deviation from Nominal Phase	±0.5°	
	> 2 to ≤ 20	Deviation from Nominal Phase	±1.25°	
	> 20 to ≤ 40	Deviation from Nominal Phase	±1.5°	
	> 40 to ≤ 50	Deviation from Nominal Phase	±2.0°	

85056G 2.4 mm Data-Based Mechanical Calibration Kit with Option CDA (Characterized Data-Based)

Device	Frequency (GHz)	Parameter	Specification (Male)	Specification (Female)
Broadband loads	DC to ≤ 50	Magnitude Deviation	≤ -49 dB to ≤ -35 dB Fitted Line[1]: ≤−49 dB + (0.28 dB/GHz) × f	≤ -50 dB to ≤ -37 dB Fitted Line[1]: ≤−50 dB + (0.26 dB/GHz) × f
Offset opens	DC to ≤ 2	Deviation from Nominal Phase	±0.5°	±0.5°
	> 2 to ≤ 20	Deviation from Nominal Phase	±1.25°	±1.25°
	> 20 to ≤ 40	Deviation from Nominal Phase	±1.75°	±1.75°
	> 40 to ≤ 50	Deviation from Nominal Phase	±2.25°	±2.25°
Offset shorts	DC to ≤ 2	Deviation from Nominal Phase	±0.5°	±0.5°
	> 2 to ≤ 20	Deviation from Nominal Phase	±1.25°	±1.25°
	> 20 to ≤ 40	Deviation from Nominal Phase	±1.5°	±1.5°
	> 40 to ≤ 50	Deviation from Nominal Phase	±2.0°	±2.0°

1. Fitted line is in dB, dependent variable f is frequency in GHz.

85058G 1.85 mm Data-Based Mechanical Calibration Kit

Device	Frequency (GHz)	Parameter	Specification (Male)		Specification (Female)	
Broadband loads	DC to ≤ 35	Return Loss	≥ 30 dB	≤ 0.03162 (Lin Mag)	≥ 30 dB	≤ 0.03162 (Lin Mag)
	> 35 to ≤ 67	Return Loss	≥ 28 dB	≤ 0.03981 (Lin Mag)	≥ 28 dB	≤ 0.03981 (Lin Mag)
Adapters	DC to ≤ 4	Return Loss	≥ 32 dB	≤ 0.02512 (Lin Mag)	≥ 32 dB	≤ 0.02512 (Lin Mag)
	> 4 to ≤ 23	Return Loss	≥ 24 dB	≤ 0.06310 (Lin Mag)	≥ 24 dB	≤ 0.06310 (Lin Mag)
	> 23 to ≤ 50	Return Loss	≥ 22 dB	≤ 0.07943 (Lin Mag)	≥ 22 dB	≤ 0.07943 (Lin Mag)
	> 50 to ≤ 67	Return Loss	≥ 20 dB	≤ 0.10000 (Lin Mag)	≥ 20 dB	≤ 0.10000 (Lin Mag)
	DC to ≤ 4	Insertion Loss	≥ -0.3 dB	≥ 0.96605 (Lin Mag)	≥ -0.3 dB	≥ 0.96605 (Lin Mag)
	> 4 to ≤ 26.5	Insertion Loss	≥ -0.5 dB	≥ 0.94406 (Lin Mag)	≥ -0.5 dB	≥ 0.94406 (Lin Mag)
	> 26.5 to ≤ 50	Insertion Loss	≥ -0.7 dB	≥ 0.92257 (Lin Mag)	≥ -0.7 dB	≥ 0.92257 (Lin Mag)
	> 50 to ≤ 67	Insertion Loss	≥ -0.9 dB	≥ 0.90157 (Lin Mag)	≥ -0.9 dB	≥ 0.90157 (Lin Mag)
Offset opens	DC to ≤ 10	Deviation from Nominal Phase	±2.0°		±2.5°	
	> 10 to ≤ 50	Deviation from Nominal Phase	±3.0°		±3.5°	
	> 50 to ≤ 67	Deviation from Nominal Phase	±4.5°		±5.0°	
Offset shorts	DC to ≤ 20	Deviation from Nominal Phase	±1.5°		±1.5°	
	> 20 to ≤ 30	Deviation from Nominal Phase	±2.0°		±2.0°	
	> 30 to ≤ 40	Deviation from Nominal Phase	±2.0°		±2.5°	
	> 40 to ≤ 50	Deviation from Nominal Phase	±2.0°		±3.5°	
	> 50 to ≤ 67	Deviation from Nominal Phase	±3.0°		±4.0°	

85058G 1.85 mm Data-Based Mechanical Calibration Kit with Option CDA (Characterized Data-Based)

Device	Frequency (GHz)	Parameter	Specification (Male)	Specification (Female)
Broadband loads	DC to ≤ 67	Magnitude Deviation	≤ -47 dB to ≤ -35 dB Fitted Line[1]: ≤ -47dB + (0.17910 dB/GHz) × f	≤ -46 dB ≤ -35 dB Fitted Line[1]: ≤ -46 dB + (0.16418 dB/GHz) × f
Offset opens	DC to ≤ 10	Deviation from Nominal Phase	±2.0°	±2.5°
	> 10 to ≤ 50	Deviation from Nominal Phase	±3.0°	±3.5°
	> 50 to ≤ 67	Deviation from Nominal Phase	±4.5°	±5.0°
Offset shorts	DC to ≤ 20	Deviation from Nominal Phase	±1.5°	±1.5°
	> 20 to ≤ 30	Deviation from Nominal Phase	±2.0°	±2.0°
	> 30 to ≤ 40	Deviation from Nominal Phase	±2.0°	±2.5°
	> 40 to ≤ 50	Deviation from Nominal Phase	±2.0°	±3.5°
	> 50 to ≤ 67	Deviation from Nominal Phase	±3.0°	±4.0°

1. Fitted line is in dB, dependent variable f is frequency in GHz.

Environmental Requirements

Parameter	Limits
Temperature	
Operating[1]	+20 °C to +26 °C
Storage	-40 °C to +70 °C
Error-corrected range[2]	+/- 1 °C of measurement calibration temperature
Relative humidity	Type tested, 0% to 95% at 40 °C, non-condensing

1. The temperature range over which the calibration standards maintain conformance to their specifications
2. The allowable network analyzer ambient temperature drift during measurement calibration and during measurements when the network analyzer error correction is turned on. Also, the range over which the network analyzer maintains its specified performance while correction is turned on.

Ordering Information

Model Number	Frequency Range	Connector Type
85050G	DC to 18 GHz	7 mm
85054G	DC to 18 GHz	Type-N
85052G	DC to 33 GHz	3.5 mm
85055G	DC to 44 GHz	2.92 mm
85056G	DC to 50 GHz	2.4 mm
85058G	DC to 67 GHz	1.85 mm

Option Number	Description	Note
CDA	Characterized data-based	The characterized data specific to the serial number of the calibration kit is provided as a XKT file.
201	Adapter, 2.4 mm Ruggedized female to 2.92 mm female	Available for 85055G only
202	Adapter, 2.4 mm Ruggedized female to 2.92 mm male	Available for 85055G only
UK6	Commercial calibration certificate with test data	

Contents List Excluding Miscellaneous Items

85050G 7 mm Data-Based Mechanical Calibration Kit

Part Number	Description	Qty
85050-60022	7 mm Open	1
85050-60023	7 mm Short	1
85050-60024	7 mm Broadband Load	1
8710-1766	Torgue wrench, 12lb-in 3/4-in Open-end	1

85054G Type-N Data-Based Mechanical Calibration Kit

Part Number	Description	Qty
85054-60066	Type-N, Male Open	1
85054-60067	Type-N, Male Short	1
85054-60068	Type-N, Male Broadband Load	1
85054-60069	Type-N, Female Open	1
85054-60070	Type-N, Female Short	1
85054-60071	Type-N, Female Broadband Load	1
85054-60074	Adapter, Type-N, Female - Female	1
85054-60075	Adapter, Type-N, Male - Male	1
08513-20014	Wrench - Spanner	1
8710-1766	Torgue wrench, 12lb-in 3/4-in Open-end	1

85052G 3.5 mm Data-Based Mechanical Calibration Kit

Part Number	Description	Qty
85052-60089	3.5 mm Male Open	1
85052-60090	3.5 mm Male Short	1
85052-60091	3.5 mm, Male Broadband Load	1
85052-60092	3.5 mm, Female Open	1
85052-60093	3.5 mm, Female Short	1
85052-60094	3.5 mm, Female Broadband Load	1
85052-60095	3.5 mm Adapter, Female – Female	1
85052-60096	3.5 mm Adapter, Female – Male	1
85052-60097	3.5 mm Adapter, Male – Male	1
8710-1761	Wrench, 7 mm Open-end	1
8710-1765	Torgue wrench, 8lb-in 5/16-in Open-end	1

85055G 2.92 mm Data-Based Mechanical Calibration Kit

Part Number	Description	Qty
85055-60013	2.92 mm, Male Open	1
85055-60014	2.92 mm, Male Short	1
85055-60015	2.92 mm, Male Broadband Load	1
85055-60016	2.92 mm, Female Open	1
85055-60017	2.92 mm, Female Short	1
85055-60018	2.92 mm, Female Broadband Load	1
85055-60019	Adapter, 2.92 mm, Female- Female	1
85055-60020	Adapter, 2.92 mm, Female - Male	1
85055-60021	Adapter- 2.92 mm, Male- Male	1
5012-9118	Wrench, 10 mm Open-end	1
8710-2466	Wrench, 8 mm Open-end	1
8710-1765	Torgue wrench, 8lb-in 5/16-in Open-end	1

85056G 2.4 mm Data-Based Mechanical Calibration Kit

Part Number	Description	Qty
85056-60073	2.4 mm, Male Open	1
85056-60074	2.4 mm, Male Short	1
85056-60075	2.4 mm, Male Broadband Load	1
85056-60076	2.4 mm, Female Open	1
85056-60077	2.4 mm, Female Short	1
85056-60078	2.4 mm, Female Broadband Load	1
85056-60079	Adapter, 2.4 mm, Male - Male	1
85056-60080	Adapter, 2.4 mm, Female - Female	1
85056-60081	Adapter, 2.4 mm, Male - Female	1
8710-1761	Wrench, 7 mm Open-end	1
8710-1765	Torgue wrench, 8lb-in 5/16-in Open-end	1

85058G 1.85 mm Data-Based Mechanical Calibration Kit

Part Number	Description	Qty
85058-60133	1.85 mm, Male Open	1
85058-60134	5.4 mm, Male Short	1
85058-60135	1.85 mm, Male Broadband Load	1
85058-60136	1.85 mm, Female Open	1
85058-60137	5.4 mm, Female Short	1
85058-60138	1.85 mm, Female Broadband Load	1
85058-60139	Adapter, 1.85 mm, Male - Male	1
85058-60140	Adapter, 1.85 mm, Female - Female	1
85058-60141	Adapter, 1.85 mm, Male - Female	1
8710-1765	Torgue wrench, 8lb-in 5/16-in Open-end	1
8710-2466	Wrench, 8 mm Open-end	1

Additional Information

Reference

Specifying Calibration Standards and Kits for Keysight Vector Network Analyzers (.pdf 10.56 MB)

Summary

Unlike Keysight's traditional mechanical calibration kits, the 8505xG Data-based mechanical calibration kits employ new data-based models and the option CDA eliminates the sliding loads and makes the operation easy.