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With a set of the set of th	Add Block Charles Block as Charles Charles	Y Circuit C C L R Weight of Constant Finance Proto Visite Proto Visite Proto Visite Proto Visite Proto Visite Proto	- 0 05 01 00mm 3 999991142 2 2 2 2 2 2 2 2 2 2 2 2 2
Ne Channel 1 S Apply Fistures OK		Save Fidure	K Cancel Help













	1. Describe Fixture 2. Specify Standards 3. Measure Standards 4. Remove Fixture 5. Save Fixture For my calibration standards I have:
	Thru Fixture A Fixture A Short
Define What Standa To Be Measured	rd
	 Advanced Settings My thru fixture has: Known thru length = 0 ns
	Unknown thru length computed using reflects. Unknown thru length computed using fixtured DUT measurements.











Adjusting Receivers with Embedded-LO Application

Coarse-tune process:

- Set input to nominal RF frequency
- Calculate IF based on nominal DUT LO frequency
- Perform broadband receiver sweep
- Identify center-frequency offset
- Adjust receiver tuning of PNA-X

Fine-tune process:

- Perform ratioed phase measurement using R1 and B receivers
- Measure phase versus time
- Use slope to calculate fine offset for receiver tuning

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C Enable Embedded LO LO Search Tuning Method Broadband and Precise Tuning Point Middle Point ↓ 101 p Tune every 1 sweeps Broadband Search 3.000 MHz IFBW 30.000 kHz IFBW 30.000 kHz Max Iterations 5 sweeps Tolerance 1.000 Hz LO Frequency Delta -882.635 Hz Find Now to trigge search for LO Sweep:1 Broadband Sweep From:54850081.562000Hz From:54850081.562000Hz From:54850081.562000Hz Sweep:2 Precise(CW) Sweep From:50.0000005 Tro.0.02057s Found to at Δ-881.759000Hz Sweep: From:0.0000005 Tro.0.02057s Found to at Δ-881.759000Hz From:54850081.562000Hz From:50.000005 Tro.0.02057s Found to at Δ-881.759000Hz From:50.000005 Tro.0.02057s	Embedded	0 ×
Tolerance 1.000 Hz Press "Find Now" to trigge search for LO LO Frequency Delta -882.635 Hz Find Now Sweep:1 Broadband Sweep From:548500881.562000Hz LO found at ~-881Hz from specified LO frequency Found to at Δ -881.562000Hz Sweep:2 Precise(CW) Sweep From:0.002067s Found to at Δ -882.759000Hz V V	✓ Enable En LO Search Tuning Me Tuning Po Tune ever Broadband IFBW Max Iterat	edded LO nod Broadband and Precise int Middle Point int int int int int int int int int
Sweep:1 Broadband Sweep From:548500881.562000Hz To:551500881.562000Hz Found lo at Δ -881.562000Hz Sweep:2 Precise(CW) Sweep From:0.000000s To:0.002057s Found lo at Δ -882.759000Hz	Tolerance LO Freque	1.000 Hz Press "Find Now" to trigge search for LO
Sweep:2 Precise(CW) Sweep From:0.000000s Found lo at 4.882.759000Hz	Sweep:1 Bro From:54850 Found Io at	dband Sweep I81.562000Hz To:551500881.562000Hz A -881.562000Hz C found at ~-881Hz from specified LO frequency
	Sweep:2 Pr From:0.0000 Found to at	ise(CW) Sweep Ds To:0.002057s -482.759000Hz

PNA Phase Noise Measurement Application S930317B/S930321B • PNA/PNA-X: The first VNAs that have phase noise measurement function, taking the advantage of the new, low-PN DDS source • Frequency range • 10 MHz to 70 GHz S930317B for N522xB/4xB models • 10 MHz to 125 GHz S930321B for N5290A/91A models · Offset frequency range • 0.1 Hz to 10 MHz · Measurement parameters · Phase noise, AM noise, residual noise, integrated noise and spurious · Phase noise measurement noise floor comparable with X-series SAs (UXA/PXA) • 34 seconds per sweep (1 Hz to 10 MHz offset) No cross correlation available X-D-

VNA Hardware F	eature	Compa	arison					
Best				Ekert for transfer			C.	
Performance	PNA-X (NA520xA)	PNA-X (N524xB)	PNA (N522xB)	PNA-L (N523xB)	ENA-X (E5081A)	ENA (E5080B)	Streamline (P50xxA/B)	FieldFox (N99xx)
Display	12.1 inch touchscreen	External PC	6.5 inch					
Source attenuators	Yes	Yes	Yes	Yes (opt x16)	Yes	Yes	Yes	No
Receiver attenuators	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Internal bias tees	Yes	Yes	Yes	No	No	Yes (Opt.120/140, up to 20 GHz)	No	
Internal pulse modulators	Available soon	Yes	Yes	No	Yes	Yes	Yes	No
Internal pulse generators	Available soon	Yes	Yes	No	Yes	Yes	Yes	No
GPIB	Yes	Yes	Yes	Yes	Yes (Opt.172)	Yes (Opt.172)	No	No
Handler I/O	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Parallel and serial DIOs for DUT control	No	No	No	No	Yes (Device test I/O)	Yes (Device test I/O)	No	No
Digital I/O for pulsed measurements	Yes (pulse I/O)	Yes (pulse I/O)	Yes (pulse I/O)	No	Yes (Application I/O)	Yes (Application I/O)	Yes (w/ Y1731A)	No
Internal DC sources	Yes	Yes	Yes	Yes	Yes (Opt.175)	Yes (Opt.175)	No	Yes
DC measurements	Yes	Yes (x2)	Yes (x2)	Yes (x2)	Yes (x4, Opt.175)	Yes (x4, Opt.175)	No	Yes
Maximum number of internal sources	4	3	2	1	2	2	2	1
Configurable test set	Yes	Yes	Yes	Yes (Opt.x16)	Yes	No	No	No
Internal combiner	Yes up to 2	Yes	No	No	No	No	No	No
Low-noise receiver	Yes	Yes	No	No	Yes	No	No	No)

Optional Software	otional Software Feature Comparisons (1)							
Feature	PNA-X (NA520xA)	PNA-X (N524xB)	PNA (N522xB)	PNA-L (N523xB)	ENA-X (E5081A)	ENA (E5080B)	Streamline (P50xxA/B)	FieldFox (N99xx)
Automatic fixture removal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Time domain analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced time domain analysis with TDR	Not yet	Yes	Yes	Yes	Yes	Yes	Yes	No
Real-time S-parameter and power measurement uncertainty	Not yet	Yes	Yes	Yes	Yes	Yes	Yes	No
Basic pulsed-RF measurements	Available soon	Yes	Yes	No	Yes	Yes	Yes	Yes
Advanced pulsed-RF measurements	Available soon	Yes	Yes	No	No	No	No	No
Mechanical noise tuner control	Not yet	Yes	No	No	Yes	Yes	Yes	No
Noise figure measurements	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes (Y-factor)
Impedance analysis	No	No	No	No	No	Yes	No	No
Modulation distortion analysis	Available soon	Yes	No	No	Yes	No	No	No
Scaler mixer converter measurements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Vector mixer converter measurements or Vector mixer characterization	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Embedded LO capability	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Gain compression application	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Intermodulation distortion measurements	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Source phase control	Yes	Yes	Yes	No	Yes	Yes	Yes	No

				Terrary			1 and	
Feature (N	PNA-X IA520xA)	PNA-X (N524xB)	PNA (N522xB)	PNA-L (N523xB)	ENA-X (E5081A)	ENA (E5080B)	Streamline (P50xxA/B)	FieldFox (N99xx)
Differential and I/Q device measurements	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Spectrum analysis	Available soon	Yes	Yes	Yes	Yes	Yes	Yes	Yes optional on N991x/5x
Active hot parameters	Not yet	Yes	No	No	Yes	Yes	Yes	No
Fast CW measurements	Available soon	Yes	Yes	No	No	No	No	No
True-mode stimulus	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Material properties measurement w/ AN1500A	Available soon	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PLTS for signal integrity	Available soon	Yes	Yes	Yes	Yes	Yes	Yes	No
Automated Measurement Expert (AMX)	No	No	No	No	Yes	Yes	Yes	No
Multiport calibrated measurement (n>4)	/es (w/ test set)	Yes (w/ test set)	Yes (w/ test set)	Yes (w/ test set)	No	No	Yes	No
Nonlinear Vector Network Analysis (NVNA)	Available soon	Yes	No	No	No	No	No	No
Device Measurement eXpert (DMX) and A limit assistance	Available soon	Yes	Yes	Yes	Yes	Yes	Yes	No
Built-in performance test software for standard compliant calibration	Available soon	Yes	Yes	Yes	No	No	No	No
Transportable, USB, network licenses	Yes	Yes	Yes	Yes	Yes	Yes	No	No

Current measurement model and uncertainty (WITHOUT DYNAMIC UNCERTAINTY) Raw DUT Post processing of the data is required Measurements to establish uncertainty. Uncertainty is based on published • specifications (Instrument, Calibration kit & some cable definitions) Calibration Uncertainty data is static in nature. Coefficients • • Does require programming to integrate uncertainty into product data sheet Corrected DUT Measurements 78

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✓ Uncertail File - Edit Uncertainty Edites Cables Delta	Inty Manager-Workspace - s800default.mi4 t - Repeatability - Noise - Cables - Plot - Help - Part SetUp III - Calkit Editor Repeatability Characterization STEP 1; Connect a LOAD at port 1 and press Start Measurements.	23 70 dBm)
- 🖼 Port	VNA setup Number of herations IFBandWidth (Hz): 1000 Power (dBm): 5.00 Points: 801 Start (GHz): 0.010000000 b Stop (GHz): 26.00000000 Start Measurements Stop Measurement and Cancel OK Cancel	Measurement of Test Port repeatability Requires a standard S-Parameter calibration • Uses this calibration to determine the repeatability of the system • Uses a Load and Short • At least 10 iterations are recommended
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