

Frequency	Dynamic range	Trace noise	Output power
300 kHz to 6 GHz	120 dB	<0.008 dB	-50 to +7 dBm



Key Features

- 2-port 2-path s-parameters
- USB control with included eVNA View software
- Standard SCPI command-set for measurement automation
- High measurement speed and throughput
- Integrated bias-tee for active device measurement
- Time domain analysis & gating
- eMCal (electronic calibration) coming soon
- Port extension & de-embedding
- Touchstone s1p / s2p file import & export
- Simulation mode
- 3-year warranty

Applications

- Production test systems
- RF & microwave product design
- University lab test benches
- Antenna tuning / VSWR measurement
- Passive component characterization
- Amplifier P1dB measurement

Product Overview

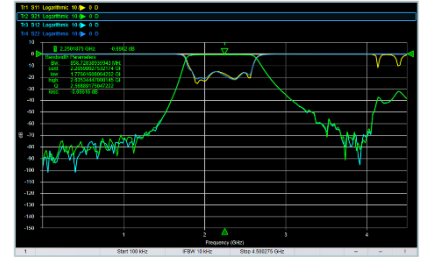
Mini-Circuits' eVNA-63+ is a high performance, software-controlled vector network analyzer (VNA). By moving the complex data processing and calculation required of vector network measurements out of the instrument and into an advanced software package, Mini-Circuits is able to offer a fully-featured but cost effective VNA for every test bench.

The product ships with Mini-Circuits' eVNA View software, providing a powerful user interface which will feel familiar to any engineer with experience of VNA measurements. eVNA View also includes a full API with SCPI support, allowing automation of VNA calibrations, measurements, trace displays and data exports from a custom control program.

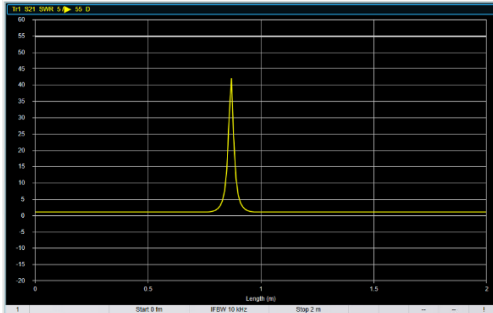
Feature Highlights

S2P Measurements

Full characterization of 1 port and 2 port devices with options to analyze S11, S12, S21, S22 from a single sweep. Vector phase and magnitude data can be visualized through the eVNA View software or exported as a data file. Standard Touchstone s2p data files can be imported for further analysis.



Time Domain Analysis & Gating



Extend measurement capabilities to include time domain (based on time domain reflectometry) to allow analysis of the time or distance to impedance changes and discontinuities in a transmission line. This is a highly versatile measurement technique that supports applications such as fault finding in cables (distance to bends & breaks) and PCB assemblies (analysis of discontinuities at each stage of the circuit).

Time domain gating adds the ability to mathematically remove any known effects from the response, to allow the analysis to be concentrated on specific points of interest. For example, if a circuit assembly is already known to have a poor input impedance, the input response can be removed from the measurement to provide focus on the impedance changes across the rest of the assembly.

eVNA-63+ includes time domain capabilities at no extra cost!

Flexible User Calibration Options

eVNA-63+ supports a number of user calibration options, supporting efficient and accurate measurements in most test environments:

- SOLT (Short, Open, Load, Thru) – Straight forward calibration process based on measurements of defined calibration accessories, ensuring high accuracy measurements when properly carried out. Mini-Circuits provides optional calibration and accessory kits containing all required components.
- TRL (Thru, Reflect, Line) – Flexible calibration method based on user defined standards, well suited to measurements of a DUT with no convenient connector interface, such as semiconductor ICs.
- eMCal - Mini-Circuits' eMCal electronic calibration standard will be available soon, providing a fully automated method for user calibration of the VNA, without the need for repeated connections of multiple components.



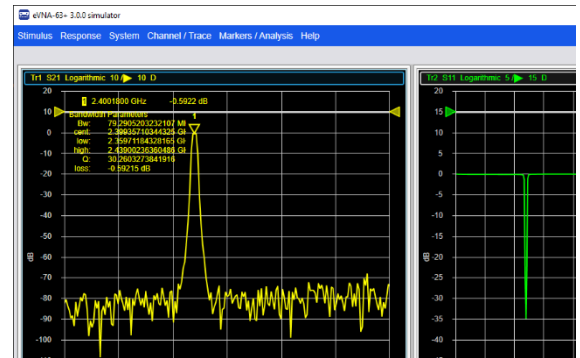
Port Extension / De-Embedding

Correct measurement results to exclude the effect of any test fixture by mathematically moving the reference planes up to the DUT input and output.

Simulation Mode

Work with a fully operational VNA with no up-front cost, hardware, or even a DUT (device under test). Connect to an internal simulator in the same way as you would connect to the real hardware and then explore the VNA's capability around a built-in band pass filter measurement. The software also accepts imported Touchstone s-parameter files to allow simulated vector network analysis of a wide range of RF components.

1. Explore the full eVNA capability prior to purchase
2. Educate yourself on proper VNA configuration and usage
3. Design and practice measurement sequences in advance of DUT availability
4. Visualize and interact with standard Touchstone s-parameter data files to properly analyze new RF component choices
 - a. Mini-Circuits has 1000s of s-parameter files available on our website for our full range of surface mount components



Remote API Control & Automation

The eVNA system is comprised of the eVNA-63+ hardware connected by USB to a host PC, running the eVNA View software. The system can be automated using a series of standardized SCPI commands (familiar to users of other VNA models) from most common programming environments, including LabVIEW and Python. Automation programs can be created on the host PC or from a remote PC, connected to the host PC via a TCP / IP network.

```

eVNA_Socket.py - F:\APFILES\PTE Documentation\Program Demos\Python\evNA_Socket.py (3.8...
File Edit Format Run Options Window Help
# Function to send SCPI query and get response
def SCPI_Query(scpi):
    s.send(str.encode(scpi + '\n'))          # Send (add new line and encode)
    try:
        evna_response = str(s.recv(1024), 'utf-8')    # Get response as string
    except:
        evna_response = 'Query failed:' + str(socket.error) # Check error
    print (scpi, '==>', evna_response)

# Send SCPI commands as needed
if connected == 1:
    SCPI_Query('SYSTEM:DISCOVER?') # Find all eVNAs USB connected to the host
    SCPI_Command('SYSTEM:CONNECT simulator') # Connect a specific eVNA by name
    SCPI_Query('*IDN?') # Identify the connected eVNA
Ln: 32 Col: 0
  
```

Power Sweep

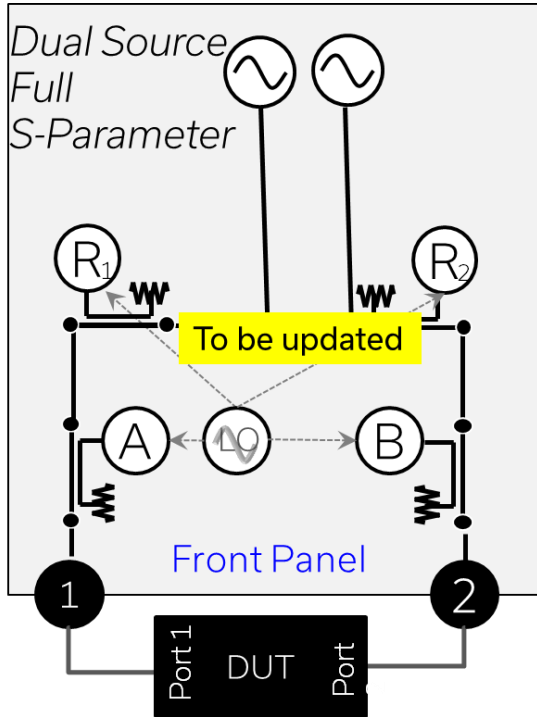
Configure an automated power sweep sequence at a fixed frequency, ideal for measurement of linearity or compression of amplifiers and other 2 port devices.

Calibrate the power accuracy with support for external USB power meters.

Internal Bias-Tees

Two bias-tee inputs allow provision of up to +24V DC / 200 mA max on either measurement port (or both), ideal for powering amplifiers in-line for s2p / P1dB characterization.

Block Diagram (Functional)



Electrical Specification @ 25°C

Frequency

Parameter	Test Conditions	Typical Performance
Frequency Range	-	300kHz – 6GHz
Frequency Resolution	300 kHz - 6 GHz	1 Hz
Frequency Accuracy	300 kHz - 6 GHz	± 7.4 ppm
Internal Reference Frequency	-	10 MHz \pm 100 Hz
External Reference Input	-	10 MHz \pm 50 Hz
Sweep Speed Conditions are deviations from the baseline setting: Measure: S11, S22 Frequency Start: 10MHz Frequency Stop: 6GHz Sweep Mode: Fast IF BW: 10kHz Points: 201	Baseline	315 ms
	Measure S11 only	160 ms
	Start/Stop: 1 to 2GHz	245 ms
	Start/Stop: 300 kHz to 6 GHz	345 ms
	Sweep Mode: Normal	1,120 ms
	IF BW: 500kHz	230 ms
	IF BW: 50Hz	1500 ms
	21 points	105 ms
2001 points	2,400 ms	

Test Ports

Parameter	Test Conditions	Typical Performance
Dynamic range	0.3 - 10 MHz	120 dB
	10 - 200 MHz	130 dB
	0.2 - 3 GHz	132 dB
	3 - 6 GHz	132 dB
Noise Floor	0.3 - 10 MHz	-120 dBm/Hz
	10 - 200 MHz	-125 dBm/Hz
	0.2 - 3 GHz	-130 dBm/Hz
	3 - 6 GHz	-130 dBm/Hz
Uncorrected Crosstalk With Load	0.3 - 10 MHz	-90 dB
	10 - 200 MHz	-120 dB
	0.2 - 3 GHz	-122 dB
	3 - 6 GHz	-122 dB
Corrected Crosstalk With Load	0.3 - 10 MHz	-95 dB
	10 - 200 MHz	-125 dB
	0.2 - 3 GHz	-127 dB
	3 - 6 GHz	-122 dB
Test Port Compression at +10dBm Input Power	0.3 - 10 MHz	0.3 dB
	10 - 200 MHz	0.3 dB
	0.2 - 3 GHz	0.3 dB
	3 - 6 GHz	0.3 dB
Trace Noise Magnitude	0.3 - 200 MHz	- dB RMS
	200 MHz - 6 GHz	- dB RMS
Trace Noise Phase	0.3 - 200 MHz	- deg RMS
	200 MHz - 6 GHz	- deg RMS
Maximum Test Port Input Level	DC	± 24 V
	300kHz - 6GHz	10 dBm
Power Supply DC Current	Continuous Operation	2 A

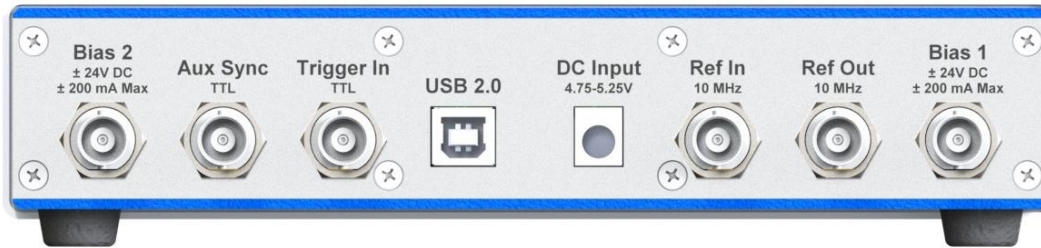
VNA System Performance with Mechanical Cal Kits

Conditions	Frequency	Directivity (dB)	Source match (dB)	Load match (dB)	Reflection tracking (dB)	Transmission tracking (dB)
SMA Calibration Kit (SOLT-63-S+) & 2x Cable (CBL-2FT-SMNM)	300 kHz - 10 MHz	-35	-35	-35	± 0.05	± 0.02
	10 MHz - 200 MHz	-35	-35	-35	± 0.05	± 0.02
	200 MHz – 3 GHz	-35	-35	-35	± 0.05	± 0.02
	3 GHz – 6 GHz	-35	-35	-35	± 0.05	± 0.02
N Calibration Kit (SOLT-63-N+) & 2x Cable (CBL-2FT-NMNM)	300 kHz - 10 MHz	-35	-35	-35	± 0.05	± 0.02
	10 MHz - 200 MHz	-35	-35	-35	± 0.05	± 0.02
	200 MHz – 3 GHz	-35	-35	-35	± 0.05	± 0.02
	3 GHz – 6 GHz	-35	-35	-35	± 0.05	± 0.02

Absolute Maximum Ratings

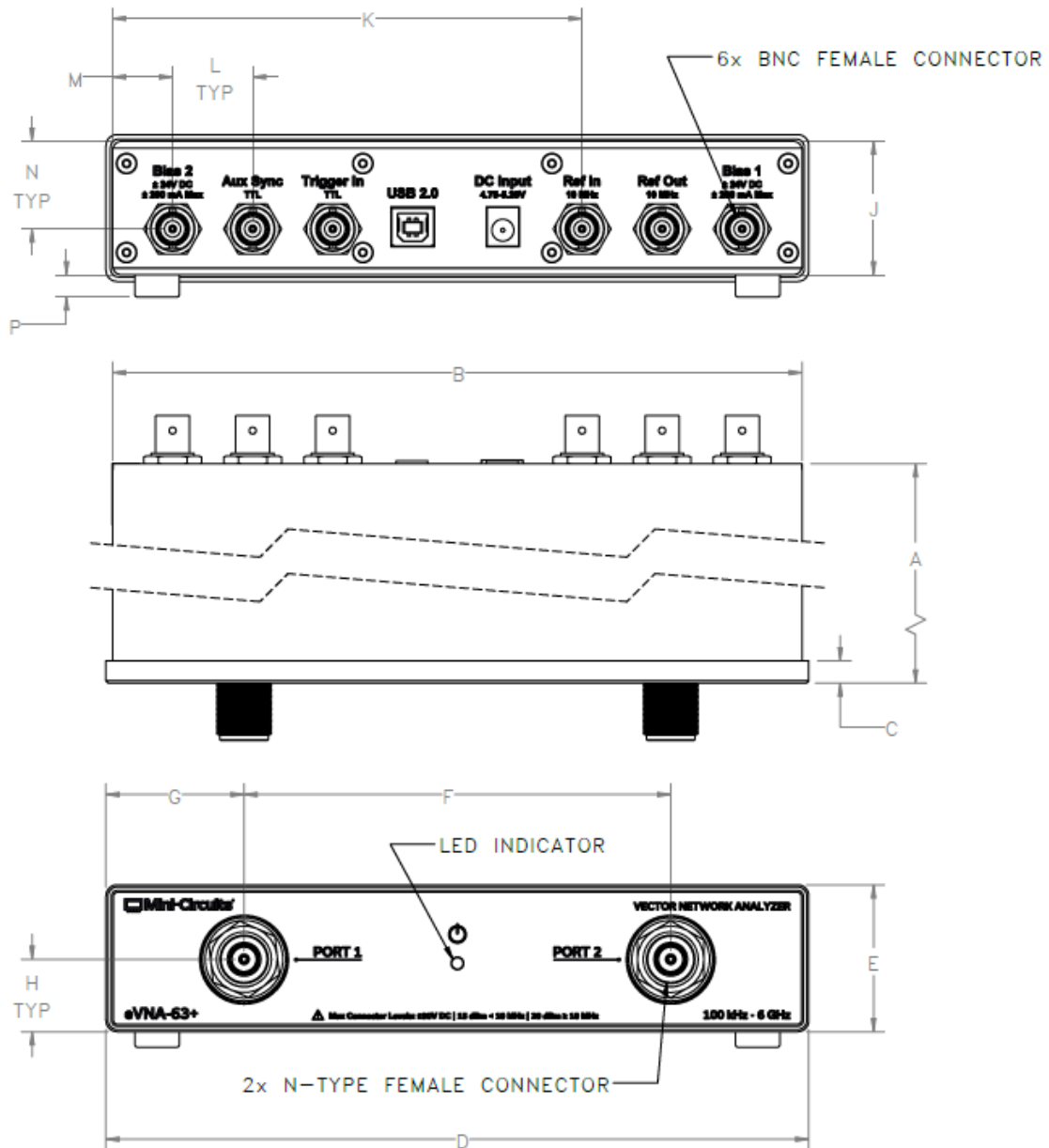
Parameter	Rating
Operating Temperature	+5°C to +50°C
Storage Temperature	-35°C to +75°C
Test Port Input Power < 10MHz	15 dBm
Test Port Input Power 10MHz - 6GHz	20 dBm
Bias Tee/Test Port DC Current	±30 V
Bias Tee DC Current	± 200 mA

Connections



Port Name	Description	Location	Connector Type
Port 1, 2	VNA Measurement Ports	Front Panel	N-Type Female, Brass
Bias 1, 2	Bias Tee "DC" Ports	Rear Panel	BNC
Ref In, Out	10MHz Reference In/Out	Rear Panel	BNC
Trigger In	External Trigger Input	Rear Panel	BNC
Aux Sync	Auxiliary Trigger	Rear Panel	BNC
USB 2.0	USB Connection to PC	Rear Panel	USB 2.0 B
DC Input	Power Supply DC Input	Rear Panel	2.5 x 5.5 x 9.5 mm barrel

Case Style (VF3213)



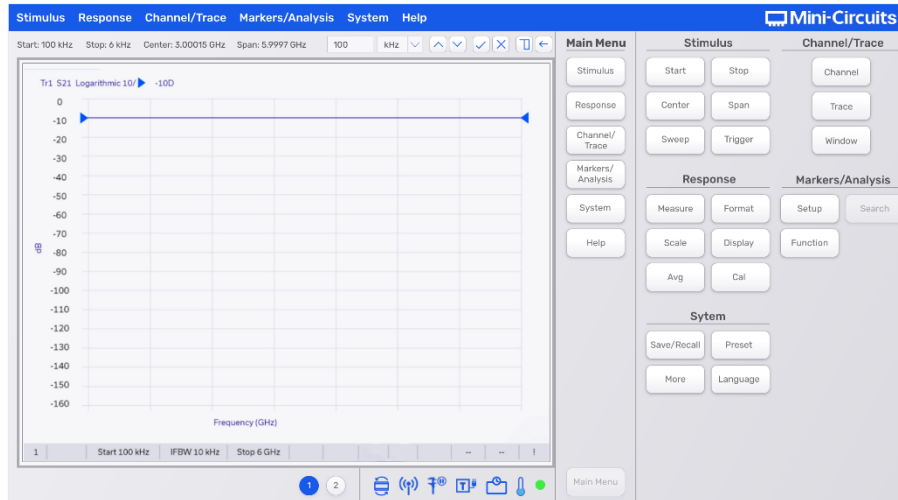
CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P
VF3213	10.02 (254.5)	7.75 (196.9)	.25 (6.4)	7.90 (200.7)	1.65 (41.9)	4.80 (121.8)	1.55 (39.4)	.81 (20.7)	1.50 (38.1)	5.28 (134)	.90 (22.9)	.67 (17.1)	.98 (25)	.25 (6.4)

Dimensions are in inches (mm). Tolerances: 2 Pl. ±.03; 3 Pl. ±.015

Notes:

1. Case and Bezel material: Aluminum alloy.
2. Finish: For Case- Powder coating. Color: Blue. For Bezel - Clear anodize.

eVNA View Software



Measurement and Display Capabilities

- Full two Port S-Parameters (S_{11} , S_{21} , S_{12} , S_{22}) as well as absolute receiver quantities from reference and reflection receivers
- Up to 16 independent Measurement Channels.
- Up to 16 display traces per Measurement Channel
- Set up to 9 markers per trace
- Display traces can be stored to memory which can be displayed or used in trace math operations (Data + Mem, Data - Mem, Data * Mem, Data / Mem)
- Display traces can be viewed in several formats: Log Mag, Phase (Deg), Phase (Rad), Group Delay, Lin Mag, SWR, Real, Imaginary, Unwrapped Phase, Positive Phase, Smith, Polar

Sweep Stimulus

- Sweep Type: Lin Freq, Log Freq, Power, Segmented
- Sweep Mode: Normal or Fast
- Number of points: Up to 20,001
- IF Bandwidth: 1 Hz to 500 kHz
- Port Power Setting: -50 dBm to +10 dBm
- Power Slope Setting: -2 to +2 dB/GHz

Analysis and Marker Functions

- Marker Search: Max, Min, Peak, Target
- Marker Function: Set sweep and scaling settings using markers as reference
- Limit and Bandwidth Tests: Integrated Pass/Fail testing for Min/Max, ripple, and bandwidth limits
- Time Domain Transform: Lowpass and Bandpass Time Domain transform
- Time Domain Gating: Fixture De-Embedding using time-domain techniques

Data Export Options

- S-Parameter File
- CSV Trace Data
- Screenshot

Calibration and Correction Capabilities

- Response
- Enhanced Response
- 1-port SOL
- 2-Port SOLT
- Unknown Thru
- Electronic Calibration
- Port Extension
- Power Calibration

Software and Documentation Download

- Mini-Circuits' eVNA View software and support including user guide, GUI, API, programming manual and examples can be downloaded from <https://www.minicircuits.com/softwaredownload/evna.html>
- Please contact testsolutions@minicircuits.com for support

Minimum System Requirements

Parameter	Required
Interface	USB 2.0 or later
System Requirements (Host PC)	Windows 7, 10
Hardware	i3 CPU, 8GB RAM

Application Programming Interface (API)

The eVNA View software suite incorporates an API which allows custom automation programs to be created for the eVNA. Most common programming environments are supported, including Python, LabVIEW, C# and MatLab.

SCPI Control

eVNA-63+ supports a comprehensive set of SCPI control commands which should be familiar to anyone that has previously programmed with a VNA. These commands expose the full range of the eVNA's capabilities, from calibration to display configuration, to measurement, to data processing.

API Control from the Host PC

The host PC has the eVNA View software package installed and is connected by USB to the eVNA-63+ instrument. The API can be used to create custom automation programs running on the host PC, using SCPI commands to control the eVNA.






API Control from a Remote PC

The complete eVNA system (host PC + eVNA View software + eVNA-63+ instrument) can be configured to allow remote control over a network connection. The remote PC connects to the eVNA's host PC using a TCP/IP connection and then has access to the full range of SCPI commands for eVNA control.

Ordering Information

Model	Description
eVNA-63+	USB Vector Network Analyzer 6GHz

Included Accessories	Part No.	Description
	AC/DC-5-3W	AC/DC 24VDC Grounded Power Adaptor. Operating temperature: 0°C to +40°C, IMax=4A
	CBL-3W-XX	AC Power Cord (Please select from options below)
	USB-CBL-AB-3+	2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)

AC Power Cords*	Part No.	Description
	CBL-3W-US	Power Cord for United States
	CBL-3W-EU	Power Cord for Europe
	CBL-3W-UK	Power Cord for United Kingdom
	CBL-3W-AU	Power Cord for Australia and China
	CBL-3W-IL	Power Cord for Isreal

* If you need a Power cord for a country not listed please contact testsolutions@minicircuits.com

Optional Accessories

P/N	Calibration Kits	Price/ea
KSOLT-6G-S+	SMA Calibration Kit 6 GHz	\$522 - \$1,302
KSOLT-6G-S+	N-Type Calibration Kit 6 GHz	\$522 - \$1,318
Cables		
CBL-2FT-NMNM+	N Male to N Male, Precision Test	\$116.95
CBL-2FT-SMNM+	N Male to SMA Male, Precision Test	\$114.95
CBL-2FT-SFNM+	N Male to SMA Female, Precision Test	\$136.95
Adapters		
SF-SM50+	Adapter SMA-M to SMA-F	\$5.95
SM-SM50+	Adapter SMA-M to SMA-M	\$8.95
SF-SF50+	Adapter SMA-F to SMA-F	\$4.95
NF-NM50+	Adapter N-M to N-F	\$11.95
NM-NM50+	Adapter N-M to N-M	\$10.95
NF-NF50+	Adapter N-F to N-F	\$9.95
Wrench		
TRQ-516-08	SMA Torque Wrench	\$114.00
TRQ-20-08	N-Type Torque Wrench 3/4" 8 lb-in	\$130.00
TRQ-20-09	N-Type Torque Wrench 20mm 8 lb-in	\$130.00
Service		
Extend Warranty to 3 years from 2		
e-VNA Calibration		
Calibration Kit Calibration		
Torque Wrench Calibration		