

# SilverLine-VNA™ (18, 26.5 and 40 GHz)

- *Vector Network Analyzer Measurements*
- *Research & Development*
- *Laboratory Use*



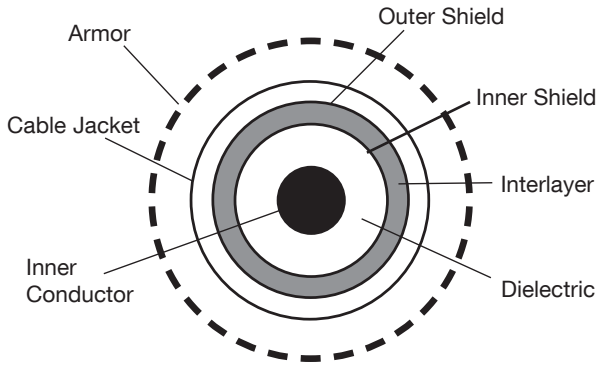
SilverLine-VNA™ is a precision test cable with excellent loss, VSWR and phase/flexure stability. Protected by a torque and crush resistant armor, SilverLine-VNA™ test cables exhibit extraordinary ruggedness comparable to OEM supplied test cables but at a fraction of the cost, making them the ideal choice for daily use in factory and lab applications.

The braided PET outer jacket makes SilverLine-VNA™ easy to handle, non-conductive and improves flexibility when compared to extruded jackets. The chrome plated metal back shell maintains the integrity of the cable to connector interface and allows for easy handling.

#### Features and Benefits:

- 18.0, 26.5 GHz cable
- Low loss 40 GHz cables now available!
- 125 °C operation
- Phase, Loss & VSWR stable
- High flex life
- Torque and crush resistant stainless steel armor
- Chrome plated strain relief back shells
- ROHS Compliant

# SilverLine-VNA<sup>TM</sup>



## Cable Construction

### Inner Conductor:

SilverLine: Solid silver plated copper clad steel  
SilverLine 40 GHz: Solid silver plated copper

### Dielectric:

SilverLine: Solid PTFE  
Silverline 40 GHz: Micro-porous PTFE

### Shield:

SilverLine: Silver plated copper flat ribbon braid.  
SilverLine 40 GHz: Silver plated copper spiral strip  
Both Cables: Metalized tape interlayer, silver plated copper round braid

### Jacket: FEP

### Armor:

100% coverage, non-interleaved, stainless steel spiral sheath for crush resistance and captured, opposing force steel braid for torque resistance. PET monofilament yarn outer cover to eliminate conductivity and improve handling.

### Connectors:

- Instrument grade
- Passivated stainless steel
- Captive center contacts
- Large selection (SilverLine 26.5 GHz)

### Attachment Method:

Solder/clamp/crimp. Protective metal back shell

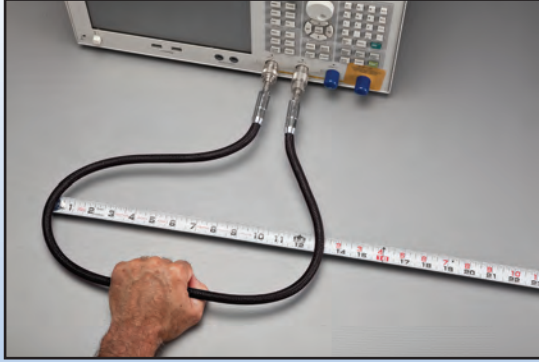
\*SMA & type N only. Assumes the use of calibrated torque wrench, proper care and cleaning of interface and mating connector is within mil spec limits.

\*\* Connector configuration and armor may limit cable assembly power handling capability.

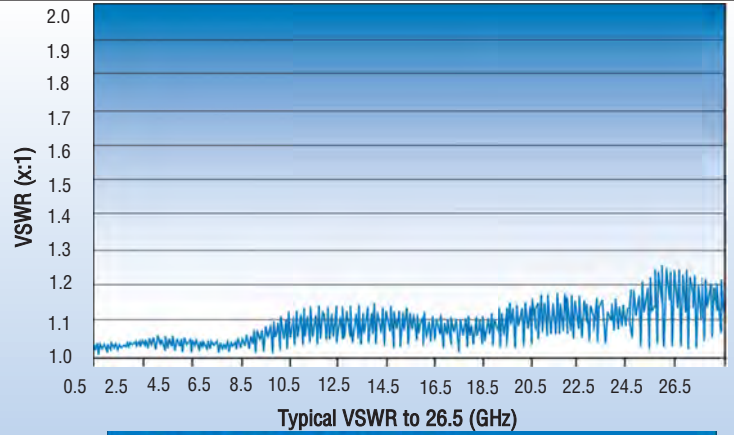
Physical & Mechanical Specifications					
	SilverLine (Cable type 91)		SilverLine 40 GHz (Cable type 18)		
Dimensions	in	mm	in	mm	
Center Conductor	0.037	0.94	0.029	0.74	
Dielectric	0.116	2.95	0.087	2.21	
Inner shield	0.126	3.20	0.091	2.31	
Interlayer	0.132	3.35	0.101	2.57	
Outer shield	0.154	3.91	0.116	2.95	
Jacket	0.195	4.95	0.140	3.56	
Weight - lb/ft (kg/m)	Cable: 0.043 (0.064) Armor: 0.066 (0.098)		Cable: 0.02 (.029) Armor: 0.066 (0.098)		
Armor Crush Resistance	1050 lbs per linear inch				
Bend Radius (min)	4.0	101.6	3.0	76.2	
Connector Retention	175 lbs				
Mating Life Cycle	5000*		N/A		
Length Tolerances	≤ 2ft (0.75m): -0,+0.5" (12.7mm) > 2ft (0.75m): -0,+2% of length				
Storage/Operating Temp	67°/+257°F -55°/+125°C		67°/+221°F -55°/+125°C		
Electrical Specifications					
VSWR (ret. loss) (max) (GHz)	1.30:1(18db) ≤ 18 1.35:1(16.5db) ≤ 26.5		1.35:1 (16.5db) ≤ 26.5 1.45: (14.7db) ≤ 40		
Impedance	50 Ohms				
Velocity of Propagation	70%		76%		
Shielding Effectiveness	> -100db		> -100db		
Capacitance pF/ft (pF/m)	29.4 (96.4)		26.8 (87.9)		
Phase Stability (degrees max)	18 GHz +/- 2, 18-26.5 GHz +/- 3, 4" radius 25k cycles 180° rev bends		40 GHz +/- 2.5° typ, +/- 5° max. see flex procedure page 3. 11k cycles		
Attenuation Max @ 77°F (+25°C)					
	GHz	db/100ft	db/100m	db/100ft	db/100m
	18	68.4	224	59.4	194.9
	26.5	88.77	290	75.6	248.0
	40	N/A	N/A	94.0	308.2
Attenuation at any frequency	k1 * f <sup>1/2</sup> (mhz) + k2 * f (mhz), where K1 = 0.348 & K2 = .0012		k1 * f <sup>1/2</sup> (mhz) + k2 * f (mhz), where K1 = 0.4206 & K2 = .0013		
Power Handling @77°F (+25°C) (Watts, avg.) (Sea Level) (Cable Only)**					
	GHz	Watts (average)			
	18	88		66	
	26.5	65		52	
	40	N/A		42	

Serialized, plotted loss and VSWR data supplied with every cable

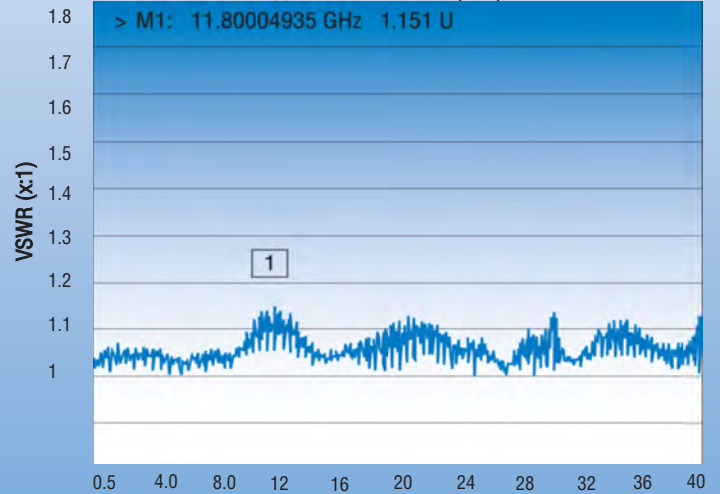
## 40 GHz Flex Test (one full cycle)



Cable is pulled off center 10" in both directions



Typical VSWR to 26.5 (GHz)



Typical VSWR to 40 (GHz)

## Ordering Information

SilverLine, Steel Armor, VNA Style

SLSVXXXX-XXXXXX-XX.XXX

Feet: 0.5ft increments  
Meters: 0.25m increments  
Min length: 2ft (0.5 meters)  
Max Length: 10ft (3.0 meters)

F = Feet, M = Meters

Cable Type  
18 or 26.5 GHz = 91  
40 GHz = 18

Maximum Frequency  
18GHz = 18  
26.5 GHz = 26  
40 GHz = 40

SM = SMA male (18 or 26.5 GHz)  
S1T = SMA male OneTurn™ (18 or 26.5 GHz)  
SF = SMA female (18 or 26.5 GHz)  
SMR = SMA right angle (18 GHz)  
35M = 3.5mm male (18 or 26.5 GHz)  
35F = 3.5mm female (18 or 26.5 GHz)  
3RF = 3.5mm ruggedized female (18 or 26.5 GHz)  
KM = 2.92mm male (cable 91 = 26.5 GHz, cable 18 = 40 GHz)  
KF = 2.92mm female (cable 91 = 26.5 GHz, cable 18 = 40 GHz)  
24M = 2.4mm male (cable 18 only, 40 GHz)  
24F = 2.4mm female (cable 18 only, 40 GHz)  
2RF = 2.4mm ruggedized female (cable 91 = 26.5 GHz, cable 18 = 40GHz)  
NM = Type N Male  
N1T = Type N OneTurn™  
NF = Type N female  
NMR = Type N right angle

First Connector

Second Connector

SilverLine 40 (cable type 18) is available with 2.92mm(K) and 2.4mm in both male & female and 2.4mm ruggedized female.

## **About Times Microwave Systems**

Times Microwave Systems, was founded in 1948 as the Times Wire and Cable Company. Today, the company specializes in the design and manufacture of high performance flexible, semi-flexible and semi-rigid coaxial cable, connectors and cable assemblies. With over 60 years of leadership in the design, development, and manufacture of coaxial products for defense microwave systems, Times Microwave Systems is the acknowledged leader, offering high tech solutions for today's most demanding applications.

Cable assemblies from Times Microwave Systems are used as interconnects for microwave transmitters, receivers, and antennas on airframes, missiles, ships, satellites, and ground based communications systems, and as leads for test and instrumentation applications.

As a highly specialized and technically focused company, Times Microwave Systems has been able to continually meet the challenges of specialty engineered transmission lines for both the military and commercial applications, drawing upon our:

- Thousands of unique cable and connector designs
- Exceptional RF and microwave design capability
- Precise material and process controls
- Unique in-house testing capabilities including RF shielding/leakage, vibration, moisture/vapor sealing, phase noise and flammability
- Years of MIL-T-81490, MIL-C-87104, and MIL-PRF-39012 experience
- ISO 9001 Certification

In 2010, Times Microwave Systems introduced its Times-Protect™ line of lightning and surge protection solutions to address the challenging needs of wireless systems in the 21st century.

With over 60 years of Times Microwave Systems aerospace cable and connector technology experience and unparalleled design expertise, Times Microwave Systems' staff of Field Applications Engineers can help to provide the right solution for your interconnect applications.



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