

RFCABLE ASSEMBLIES

samtec.com/rf

PRECISION RF CABLE ASSEMBLIES



High-Performance Microwave Cable Assemblies

Samtec's new Nitrowave[™] Phase & Amplitude Stable RF Cable offers improved stability with flexure over time. The coaxial structure – with an outer jacket colored in distinctive Samtec orange – is designed to meet the demands of aerospace, defense, datacom, computer/semiconductor, and instrumentation markets. Performance is optimized at frequencies beyond traditional industry targets to support emerging applications.

NITROWAVE[™] CABLE TECHNOLOGY

- High-performance, low-loss microwave cable assemblies
- Phase and amplitude stable with flexure
- Consistent contact resistance between layers
- Lower density dielectric minimizes loss
- State-of-the-art shielding techniques and interlayer
- Silver plating enhancements mitigate corrosion potential
- Electrical performance optimized at next gen frequencies (GHz): 18, 32, 43.5, 71, 95, 110
- Mechanical and environmental robustness
- Phase vs. Bending = < 0.2° x F(GHz)
- VSWR = 1.4:1 @ 43.5 GHz (LL043 Series)
- Typical phase vs. temp & power handling: see product spec sheet

MAXIMUM INSERTION LOSS (dB/m)



"We challenged every assumption about what makes a great cable and did not rest until we optimized every element. We invested in new technologies, and new materials, allowing for better process controls and ultimately better overall performance and stability."

~ Microwave Cable Engineering Manager, Samtec





INTERLAYER IMPROVES STABILITY

Solutionator.



TESTING & TECHNICAL SUPPORT

High-level design and development of advanced interconnect systems along with industry leading expertise allow us to offer effective strategies and support for optimizing the entire signal channel. RF technical support includes launch optimization, simulation, and testing.

Contact **RFGroup@samtec.com** to discuss your application and testing requirements.





PRECISION RF CABLE ASSEMBLIES



Microwave Cable Assemblies

Samtec offers a variety of low-loss microwave cable assemblies from .047" to .277". Larger diameter RF coaxial cable assemblies may be used for applications that require even lower loss over longer distances. Smaller diameter cable assemblies are commonly used in higher frequency applications at shorter distances. Optimized assembly design ensures precise, repeatable electrical results.

FLEXIBLE SOLUTIONS FOR CABLE TYPES FROM .047" TO .277"

- Phase matching in pairs down to 1 ps
- Cable lengths as a standard up to 10 meters (>10 meters as a custom RSP)
- VSWR as low as 1.20 max and optimized signal integrity with copper foil shielding (RF23C Series)
- Interface types: 1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm, 2.92 mm, SMA, SMPM, SMP, 3.50 mm, N Type, TNCA

- Cable management solutions available
- Small diameter cables for higher frequencies and tighter bend radius
- Larger diameter cables for even lower loss over longer distances
- Quality products with precise, repeatable electrical and mechanical results

PRODUCT TESTING CAPABILITIES

Samtec RF microwave cable assemblies are subject to dynamic flex testing proving electrical stability under high stress and flexure.

In addition, each product series undergoes rigorous initial design qualification test (DQT) procedures before product release. DQT tests include thermal aging, insulation resistance, mechanical shock and vibration, mating/unmating durability, and more.

Contact RFGroup@samtec.com to discuss your testing requirements.





samtec.com/rf-cablebuilder

Series	RF280 RF180		RF23C	RF086	RF047-A		
Cable Construction	Shown at ~1/3 scale.						
Impedance (Ω)			50				
Max Frequency (GHz)	1	8	50	67	110		
Outer Diameter (inches)	.300 .195		.105	.100	.056		
Min Static Bend Radius (inches)	1.500	0.976	0.125	0.350	0.125		
Velocity of Propagation (%)	83 80		70	80	70		
Temp Range (°C)	-55°C to +125°C		-65°C to +125°C	-55°C to +125°C	-65°C to +125°C		
End 1 / End 2	SMA, TNCA, N Type		2.40 mm, 2.92 mm, SMA, SMP, SMPM	1.85 mm, 2.40 mm, 2.92 mm, SMA, SMP, SMPM, Ganged SMPM (Magnum RF*)	1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm, 2.92 mm, SMA, SMP, SMPM, Ganged SMPM (Magnum RF [®])		

Also Available: Series RF25S, RF405, RF085, RF23S, RF402. Visit samtec.com/RF-CableAssemblies for more information.

MIX & MATCH RF CABLE ASSEMBLY FLEXIBILITY

Samtec offers a variety of end options for each product series. This blends application-specific customization with the simplicity and lead-time efficiencies of an off-the-shelf assembly.

Quickly and easily build RF cable assemblies using Samtec's innovative online RF Cable Solutionator*. Choose a connector and cable type, and create a final part number in under a minute. Results include product specifications, pricing and availability, models and prints.



PRECISION RF STANDARD INTERFACE TYPES

Туре	Standard	Mated Sets			
110 GHz, 1.00 mmRobust threaded couplingPCB: compression mount	(1.0051).03957 (0.9949).03917 DIA	Cable: LL110, LL095, RF047-A Cable Connector: PRF10 Board Connector: 100-EL			
90 GHz, 1.35 mmRobust threaded couplingPCB: compression mount	(1.356).0534 (1.341).0528 DIA	Cable: RF047-A Cable Connector: PRF13 Board Connector: 135 (-CM, -CMM)			
65 GHz, 1.85 mmRobust threaded couplingPCB: compression mountIntermateable with 2.40 mm	(1.857).0731 (1.841).0725 DIA	Cables: LL071, RF047-A, RF086 Cable Connector: PRF18 Board Connectors: 185 (-CM, -CMM, -EL)	13 2 6767		
 65 GHz, SMPM Push-on coupling 30% smaller than SMP Detents: full, smooth bore or catcher's mitt PCB: solder termination 	(2.134).084 (2.082).082 (3.556) .140 (2.235).088 (3.454) (2.184).086 .136 DIA	Cables: LL110, LL095, RF047-A, RF086, RF23C Cable Connector: PRFM0 Bullet Adaptor: PRFIA Board Connectors: SMPM (-SM, -MT, -ST-TH, -RA-TH, -EM) (Ganged, Magnum RF [*] solutions also available)			
 50 GHz, 2.40 mm Robust threaded coupling PCB: compression mount Intermateable with 1.85 mm 	(2.4079).0948 (2.3927).0942 DIA	Cables: LL043, RF047-A, RF086, RF23C, RF085 Cable Connector: PRF24 Board Connectors: 240 (-CM, -CMM, -EL)	13 2 6		
 40 GHz, SMP Push-on coupling Compensates for misalignment Detent: full, limited, smooth bore, catcher's mitt PCB: solder termination 	(3.61).142 DIA (0.38) (2.95).015 DIA (3.18) .125 DIA (3.18) .125 DIA	Cables: RF047-A, RF086, RF23C, RF25S, RF405 Cable Connectors: PRF00 Bullet Adaptor: SMP-B Board Connectors: SMP (-SM, -TH, -MT, -EM)			

*Please note: images and drawings are representative and not to scale. For complete specifications, please visit samtec.com/RF.

Туре	Standard	Ма	ted Sets
 40 GHz, 2.92 mm Robust threaded coupling PCB: compression mount Intermateable with 3.50 mm and SMA 	(2.9286).1153 (2.9134).1147 DIA	Cables: LL043, LL032, RF047-A, RF086, RF23C, RF085 Cable Connector: PRF92 Board Connectors: 292 (-CM, -CMM, -EL)	
 34 GHz, 3.50 mm & SSMA 3.50 mm is intermateable with 2.92 mm and SMA SSMA features a reduced size for high-density SSMA available as cable connector only (PRFS1) 	(3.23).1272 (3.30).130 DIA (3.23).1272	Cable: RF23S (3.50 mm) Cable Connectors: PRF35 (3.50 mm), PRFS1 (SSMA)	
 18/26.5 GHz, SMA Robust threaded coupling PCB: solder termination Intermateable with 2.92 mm and 3.50 mm 	(4.0894).161 DIA	Cables: LL071, LL043, LL018, RF047-A, RF086, RF23C, RF180, RF280, RF25S, RF405, RF402 Cable Connector: PRF01 Board Connectors: SMA (-TH, -SM, -MT, -EM)	
18 GHz, N TypeRobust threaded couplingSuperior power handling	(7.008).2759 (6.933).2753 DIA	Cables: RF180, RF280 Cable Connector: PRF06	
 18 GHz, TNCA Robust interface with environmental seal and threaded coupling 	(9.68).381 DIA (9.60).378 DIA (4.72).186 (4.62).182 DIA	Cables: RF180, RF280 Cable Connector: PRF04	<u>C</u>

PRECISION RF, 50 Ω

Interface	1.00 mm	1.35 mm	1.85 mm	2.40 mm	2.92 mm	3.50 mm	SSMA	SMA	Ganged SMPM	SMPM	SMP	N Туре	TNCA
Frequency	110 GHz	90 GHz	65 GHz	50 GHz	40 GHz	34 GHz	34 GHz	18/26.5 GHz	65 GHz	65 GHz	40 GHz	18 GHz	18 GHz

NEXT GENERATION WAVEGUIDE TECHNOLOGY



Flexible Micro Waveguide Technology

Samtec's new High Frequency Micro Waveguide Technology is designed to support the demands of next gen mmWave systems. Its cable design allows flexibility, a reduced size, and supports frequencies up to 90 GHz (E-band), while maintaining loss performance that is greatly improved over coaxial cables.

Samtec's innovative waveguide technology is a next generation alternative to rigid metallic waveguides, offering low-loss performance, flexibility, ease of use, and lower cost.

- 60 GHz to 90 GHz, E-Band & 50 GHz to 75 GHz, V-Band
- Flexible cable with dynamic stability
- Loss performance similar to traditional rigid waveguides
- Easy to use, ultra-small form factor

Product	Series	Frequency Band	Dimensions
Waveguide	WF12 = Cross section: 3.10 mm (.122") x 1.55 mm (.061") nom.	E (60 to 90 GHz)	Overall Length: 102 mm (4.00") Min. Threaded Plug: 5 mm (.196") x 8 mm (.314")
Adaptor	WGBA = UG-387 to Threaded Waveguide Jack		Diameter: 19.05 mm (.750") (mates with WR12 standard flange)

V-Band (50 to 75 GHz) WF15 Series: 3.76 mm (.148") x 1.88 mm (.074") nom. cross-section; UG-385 flange adaptor to threaded waveguide jack







samtec.com/Waveguide

BULLS EYE® TEST SOLUTIONS





High-Performance Test to 90 GHz

Bulls Eye^{*} is a proven test & measurement solution, ideal for SerDes characterization, clock/data recovery (CDR), mmWave radar systems, automated test equipment, next gen FR2 5G networks, and a variety of high-density high-performance designs.

Bulls Eye[®] High-Performance Test Assemblies feature a high-density, space-saving design that enables smaller evaluation boards and shorter trace lengths in test and measurement applications to 90 GHz.

- Compression mounts to the board for placement directly adjacent to the SerDes being characterized
- Single row or double row
- End 2 connection to instrumentation: 1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm or 2.92 mm
- Solderless design improves cost and ease of use within a lab setting
- Custom solutions also available



Traditional with SMAs vs. Bulls Eye®

ASSEMBLY	90 GHz	70 GHz	50 GHz	40 GHz	Test Assembly	SerDes Characterization
Block Bottom View						PAM4
End 2 Connector	1.00 & 1.35 mm	1.85 mm	2.40 mm	2.92 mm	BE90A, 90 GHz	224
Samtec Series	BE90A	BE70A	BE4	10A		Gbps
Cable Type	.047	.086	MWC-23	50CU-01		
Cable Management		Yes				PAM4
PCB Transition		Microstrip/CPW or S	Stripline		BE70A,	112
Bulls Eye [®]	Spring-Loaded C	Contact; 360° Grounding	Pogo-Pin for Si	gnal & Ground	G b p s	
No. of Rows	Singl	e or Double	Double			
No. of Positions	1x: 2, 4, 8, 12 2x: 4, 8, 12, 16	1x: 2, 4, 8, 12 2x: 3, 4, 6, 8, 10, 12, 14, 16	2x: 3, 4, 6, 8, 10, 12, 14, 16			
Impedance		50 Ω			PAM4	
FPGA Development Kit		_	AMD® Xilinx® Zynq® UltraScale+™ RFSoC ZCU1275		BE40A, 50 GHz	56
SI Evaluation Kit	Contact: RFgroup@samtec.com	70 GHz: REF-213864-01	50 GHz: REF	-213497-01		Gops

MULTI-CHANNEL SOLUTIONS





Ganged Multi-Port SMPM

Samtec's Magnum RF^{*} Ganged, Multi-Port Interconnect System leverages the performance, density and blind mate advantages of the push-on SMPM connector. Magnum RF^{*} is ideal for applications where space is limited and a high operating frequency is required, including 5G/6G Networking, Military/Defense, Radar, and Test & Measurement.

GANGED, MULTI-PORT RF BLOCKS, CABLE ASSEMBLIES AND ADAPTORS

- Mode-free operation up to 65 GHz supports low- or mid-band system requirements
- Micro-miniature, high-density design
- Design also lends itself to smaller diameter materials and smaller bundle sizes for weight savings and increased airflow for cooling when integrated with cable assemblies
- Interconnects are available for meeting both cable-to-board and board-to-board mating requirements
- 3.56 mm (0.140") channel pitch



40% greater density, less processing time, and better positional alignment when more than one channel is required.





Cable Assembly GC47 Series: .047" cable, 0.125" bend radius



CABLE-TO-BOARD

	Vertical Launch				
	Mated Sets		Mate	d Sets	
Edge Mount	Block	GPPC-EM	Surface	GPPC-SL or GPPC- CMM	
	Cable Assembly	GC47 or GC86	Mount		
Right-Angle	Block	GPPC-RA-SM	Cable	GC47 or	
(Belly-to-Belly or Mid-Board)	Cable Assembly	embly GC47 or GC86 Assembly		GC86	

End 2 Options: ganged or discrete

Discrete End 2 Options: 1.00 mm, 1.35 mm, 1.85 mm, 2.40 mm, 2.92 mm, SMPM, SMA

BOARD-TO-BOARD

Mezzanine					
Mated Sets					
Surface Mount	GPPB-SM, GPPC-SL or GPPC-CMM				
Bullet	PRFIA				
Surface Mount	GPPB-SM, GPPC-SL or GPPC-CMM				

Coplanar					
Mated Sets					
Edge Mount	GPPC-EM				
Bullet	PRFIA				
Edge Mount	GPPC-EM				

Perpendicular					
Mated Sets					
Edge Mount	GPPC-EM or SMPM-EM				
Bullet	PRFIA				
Surface Mount	GPPB-SM, GPPC-SL or GPPC-CMM				











- Bullet adaptors accommodate axial, radial misalignment in blind mate applications
- Spring-loaded adaptors provide higher axial misalignment tolerance for maintaining consistent signal contact
- Customized solutions include multiple rows, channel counts and channel pitches

STANDARD LOW FREQUENCY SUB-6 GHz SOLUTIONS

50 Ω SOLUTIONS

		Micro High- Frequency	SMA	МСХ	ММСХ	TNC	BNC	SMB
	Гуре	1	Sector Sector	B Comment	3 3 3	Q.	67	
Max F (Frequency GHz)	6						1
Series	Cable Assemblies	MH081 & MH113	RF174, RF316, RS316, RF178, RF058, GRF1H-C	RF174, RF178, RF316, RS316, GRF1H-C	RF174, RF316, RF316, RF178, GRF1H-C	RF174, RF316, RF316, RF178 RF058, GRF1H-C	RF174, RF178, RF316, RS316, GRF1H-C	RF174, RF316, RF178, GRF1H-C
	Cable Connectors	Right Angle Plug (-MH1RP, -MH3RP, -MH4RP)	SMA-CA Jack & Plug	MCX-CA Jack & Plug	MMCX-CA Plug; MMCXV-CA High- Vibration Jack or Plug	TNC-CA Plug & Jack	BNC5-CA Jack or Plug	SMB5-CA Jack or Plug
	Board Connectors	RSP-122811 (-01, -02, -03)	SMA Jack (-TH, -SM, -MT, -EM)	MCX Jack & Plug (-TH, -SM, -EM, -MT)	MMCX Jack & Plug (-TH, -SM, -MT, -EM); Switchable Jack (-SW); High- Vibration Plug (-TH); High-Vibration Jack (-TH, -EM)	TNC Jack (-TH)	N/A	SMB5 Jack (-TH)
Feature	s & Benefits	Space-saving, high- performance design	Non-magnetic options for medical and aerospace applications	30% smaller than SMBs; non-magnetic options for medical and aerospace applications	Simple snap-on coupling; non- magnetic options for medical and aerospace applications	Reverse polarity straight plug available; non-magnetic options for medical and aerospace applications	Quick connect & disconnect with bayonet coupling	Simple snap- on coupling; non-magnetic options for medical and aerospace applications

APPLICATION-SPECIFIC RF SOLUTIONS

Samtec has the flexibility to quickly and efficiently identify and/or develop innovative, applicationspecific interconnect solutions to meet a variety of demands in digital/analog systems.

Contact the **RFGroup@samtec.com** to discuss your application needs.



Environmentally Sealed SMA



Pick & Place Machine Designs (-BMXD options)



Counterweights for Automated Assembly

75 Ω SOLUTIONS

		BNC	DIN 1.0/2.3	HD-BNC	МСХ	ММСХ	SMB
Туре		(CO)		C. Alterna			1
Max F (Frequency GHz)		12		(5	4
	Cable Assemblies	RFC6T, RF179, RFA6T, RFB6T, GRF7H-C	RFC6T, RFC8T, RF179, RFA6T, RFB6T, RFB8T, GRF7H-C	RFC6T, RFC8T, RFA6T, RFB6T, RFB8T	RF179, GRF7H-C	RF179, GRF7H-C	RF179, GRF7H-C
Series	Cable Connectors	BNC7T-CA Jack & Plug	DIN7A-CA Plug	HDBNC-CA Plug	MCX7-CA Plug	MMCX7-CA Jack & Plug	SMB7H-CA Plug
	Board Connectors	BNC7T Jack (-TH, -BH, -BM, -EM) Diecast & Machined	DIN7A Jack (-TH); Bulkhead Jack (-BH)	HDBNC Jack (-TH, -EM); Bulkhead Jack (-BM, -BH)	MCX Jack & Plug (-TH, -SM)	MMCX Jack & Plug (-TH)	SMB Jack (-TH, -EM)
Features & Benefits		Optimized for Video	12G-SDI Broadcast solutions	4x the panel density and 20% lighter compared to standard BNC; 12G-SDI solution	30% smaller than SMBs	Simple snap-on coupling	Simple snap- on coupling

SAMTEC LOW FREQUENCY ORIGINAL SOLUTIONS • DC to 10 GHz

Visit samtec.com/OriginalRF for specifications, and to explore Samtec's full line of Original RF Solutions.



Shielded Twisted Pair System

- 100 Ω differential pair system
- 28 AWG shielded twisted pair cable
- High reliability BeCu contacts
- 1/4-turn bayonet lock

Ganged Micro-Mini System

- 50 Ω & 75 Ω board stacking and cable assemblies
- High performance rugged contacts
- Variety of End 2 connectors

IsoRate[®] High Isolation System

- 50 Ω board stacking & cable assemblies
- Half the cost of traditional RF at virtually the same performance

Mini & Micro-Mini Interconnects

- 75 Ω impedance MCX & MMCX
- 50 Ω high-vibration MMCX

High Cycle U.FL Cable Plug

- 500 cycle U.FL compatible plug
- .047" DIA flexible cable

PRECISION RF INTERCONNECT SOLUTIONS

Samtec's RF product line includes 18 to 110 GHz High Frequency, Precision RF solutions for microwave and mmWave applications, including full cable assemblies, cable connectors and board level interconnects.

Our focus is on delivering high-quality RF products that meet precision and performance expectations, along with industry-leading system-level signal integrity expertise.

VERTICAL INTEGRATION ENABLES FULL SYSTEM SUPPORT

CABLES

Design & Fabrication of Raw Cable Cable Assemblies

CONNECTORS

Design & Fabrication Cable Connectors Board Connectors

TECH SUPPORT

Launch Optimization Simulation & Testing Full System Optimization



RF DESIGN, DEVELOPMENT & TECHNICAL SUPPORT

SIGNAL INTEGRITY & RF DESIGN EXPERTISE & SUPPORT

- Launch optimization & design services
- Simulation
- Prototyping
- Physical test and measurement verification
- Full channel analysis, system support
- Application specific design and development assistance



TECHNICAL RESOURCES

Samtec's Technical Library contains white papers, application/technical notes, published papers, webinars and presentations on high-performance system design. These resources underscore how Samtec supports interconnectivity needs across multiple industries, applications, performance requirements and operating environments.

WHITE PAPERS

- Wideband RF Launches
- Impacts of Solder Reflow on RF Connectors
- Millimeter Wave Design
- Visit samtec.com/tech-library

TECHNICAL REPORTS

 Precision Alignment in Test and Measurement Applications: samtec.com/alignment

PRESENTATIONS & WEBINARS

- Understanding Transmission Line Discontinuities: samtec.com/system-impedance
- Precision RF Connector PCB Launches for 224 Gbps Devices: samtec.com/rf-launches-224

CUSTOM SOLUTIONS & QUICK-TURN MODIFICATIONS

Samtec's fully vertically integrated business model enables the flexibility to quickly and efficiently identify and/or develop innovative, application-specific interconnect solutions to meet a variety of demands in digital/analog systems.

- Board termination types
- Tin dipping capabilities
- Heat-shrink tubing
- Alternate platings
- Pick & place machine designs
- Automated assembly counterweights
- Contact RFGroup@samtec.com to discuss your system requirements



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