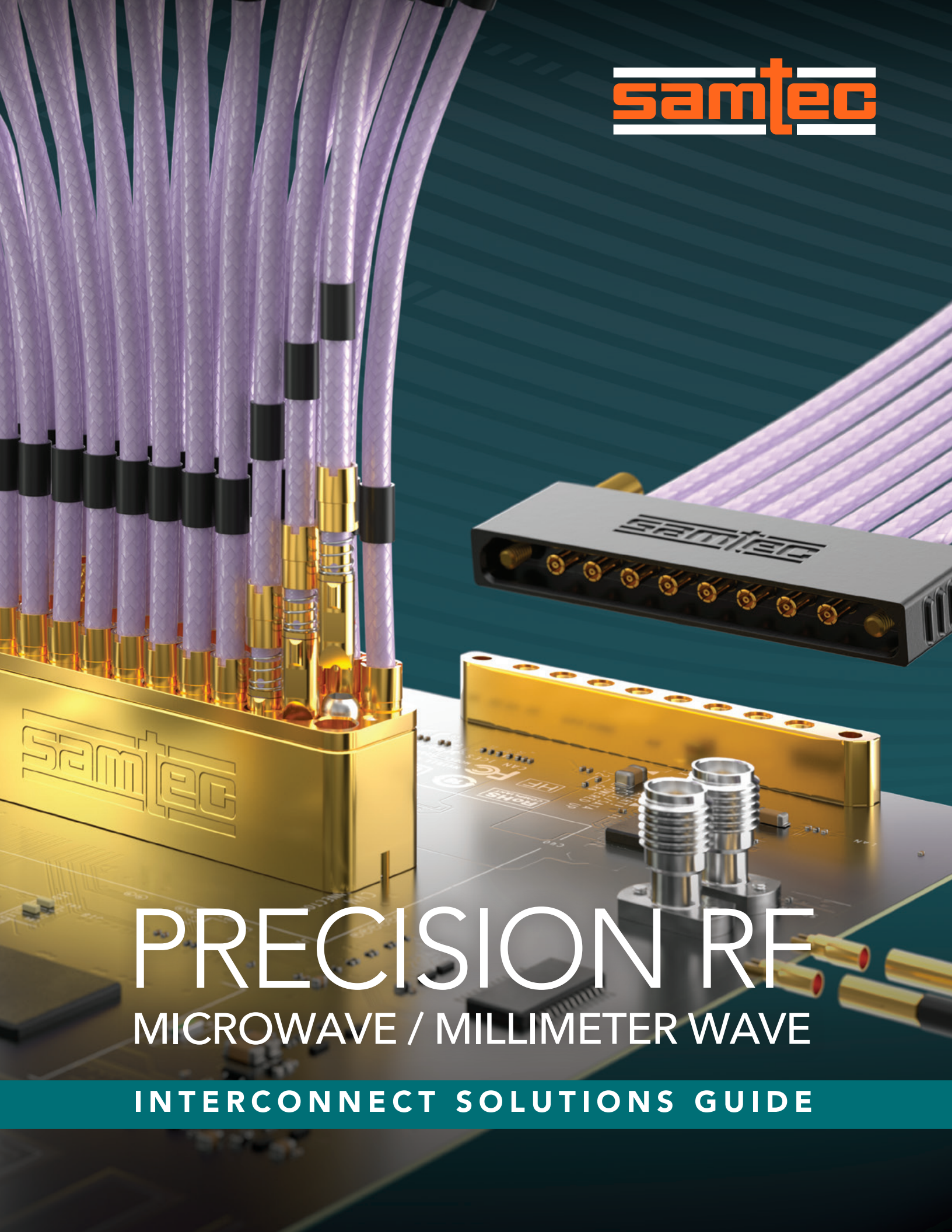


PRECISION RF

MICROWAVE / MILLIMETER WAVE

INTERCONNECT SOLUTIONS GUIDE

PRECISION RF

MICROWAVE / MILLIMETER WAVE CABLE ASSEMBLIES & INTERCONNECTS

Increasing complex systems with escalating bandwidths and shrinking footprints drive Samtec to continually expand and develop our technical expertise and capabilities. This is why we've advanced our RF product line to include Precision RF interconnects.

1.00 mm • 1.20 mm* • SMPM • 1.85 mm • 2.40 mm • SMP • 2.92 mm • 3.50 mm
SSMA • N Type • TNC • SMA • Adaptors • Bulls Eye® Test Assemblies to 70 GHz*

Industry-Leading Service

Real-time connected systems offering 24-hour responsiveness

Dedicated RF engineers and Signal Integrity experts providing personal support for meeting specific RF challenges

Launch optimization, simulations, test & measurement support

Full Assemblies & Mated Sets

Design, fabrication and assembly of RF solutions

Offering cable connectors, cable assemblies and board-level mates

Vertical integration enables the highest level of service and support in the industry

High-Performance Test Assemblies

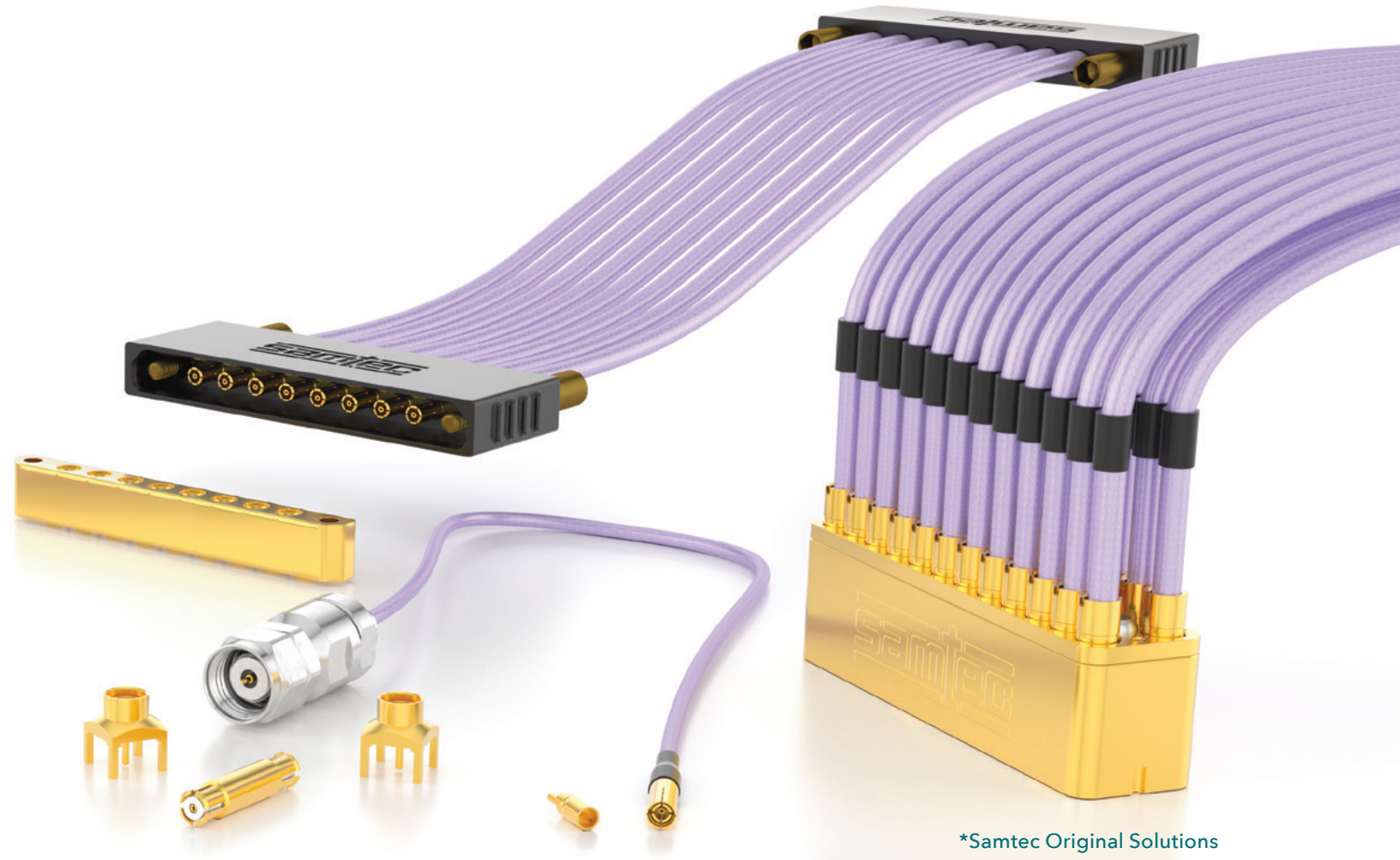
Bulls Eye® high-density arrays and advanced cabling solutions to 70 GHz

Compression interface

High-density design enables smaller evaluation boards and shorter trace lengths

Ideal for high-performance test applications

For additional information, please contact **RFTechnicalGroup@samtec.com** or visit **samtec.com/RF**.



*Samtec Original Solutions

CONNECTOR DESIGN & FABRICATION

Engineering and Support for Millimeter Wave Frequencies

MICROWAVE CABLE DESIGN & FABRICATION

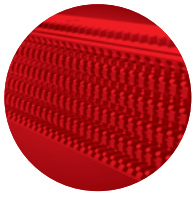
Engineering and Support for Ultra-Low-Loss Microwave Cable

TECHNOLOGY CENTERS • INTEGRATION LEADS TO INNOVATION

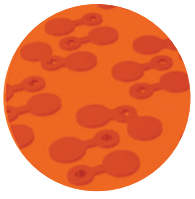
Samtec's Tech Centers are not limited by the boundaries of traditional business units, so we are able to work in a fully integrated capacity that facilitates true collaboration and innovation to support the demands of today, and the challenges of tomorrow – **Enabling Complete System Optimization ... from Silicon-to-Silicon™**

PRECISION RF

HIGH-SPEED CABLE



ADVANCED INTERCONNECTS



SYSTEM SIGNAL INTEGRITY

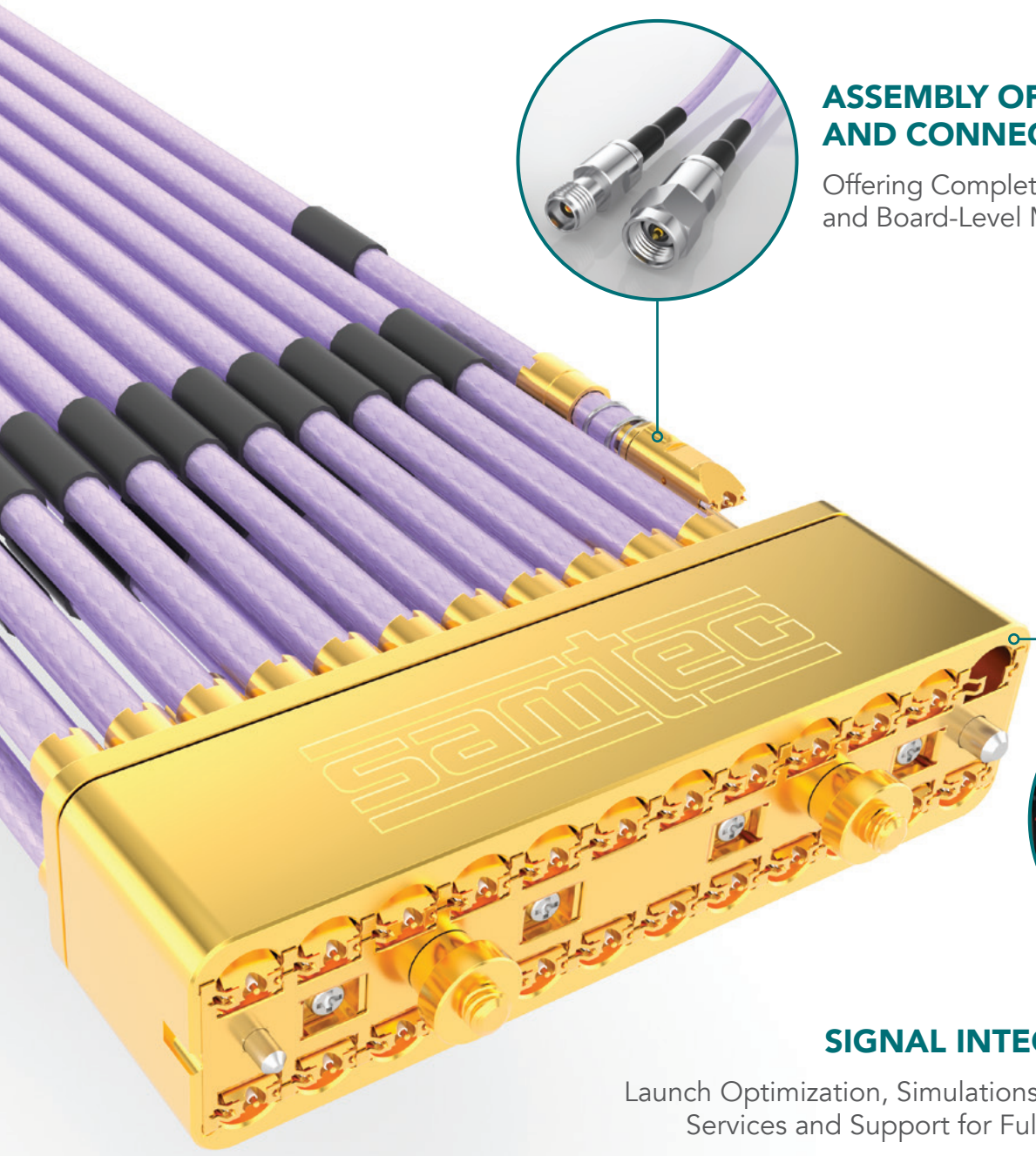
OPTICS

MICROELECTRONICS

DESIGN, FABRICATION & **ASSEMBLY**

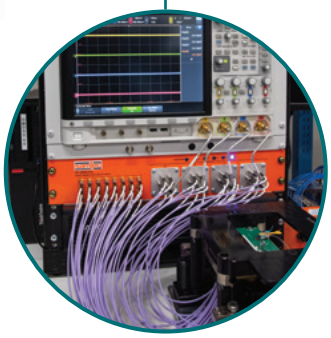
SUPPORTED BY SYSTEM-LEVEL SIGNAL INTEGRITY EXPERTISE

RF technologies require the board, cable and end terminations to all work as a single unit for optimum performance. Samtec is uniquely positioned by offering design, fabrication and assembly of RF interconnects and cables, giving us a complete understanding of each signal path connection. Samtec also offers full RF and Signal Integrity engineering support, including launch optimization, simulation and test & measurement services.



ASSEMBLY OF CABLE AND CONNECTOR

Offering Complete Assemblies and Board-Level Mates

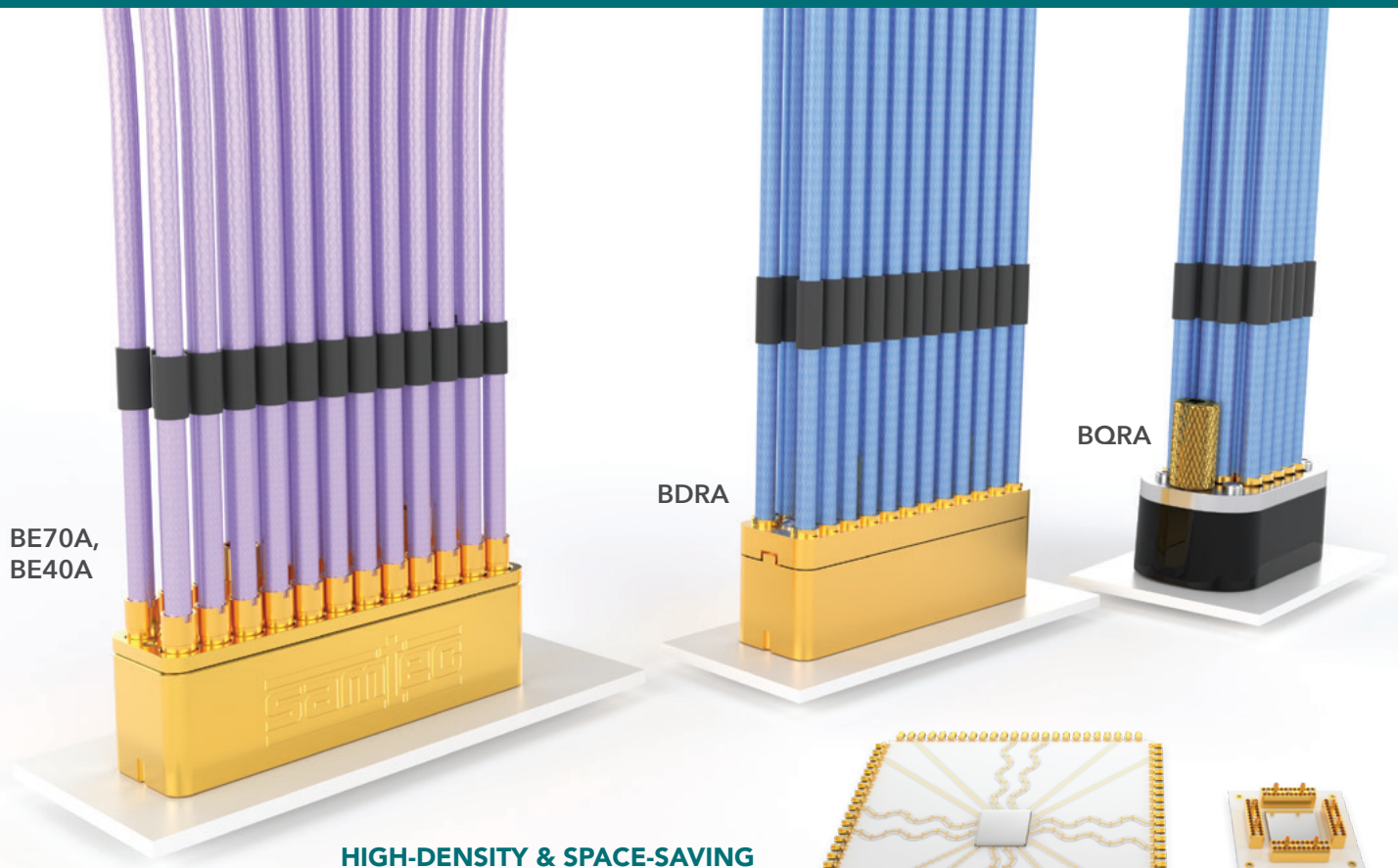


SYSTEM-LEVEL SIGNAL INTEGRITY EXPERTISE

Launch Optimization, Simulations, Test & Measurement Services and Support for Full System Optimization

HIGH-PERFORMANCE TEST **ASSEMBLIES TO 70 GHz**

HIGH-DENSITY • SPACE-SAVING • SHORT TRACE LENGTHS



HIGH-DENSITY & SPACE-SAVING

Bulls Eye® enables smaller evaluation boards and shorter trace lengths.

Traditional with SMAs

Bulls Eye®

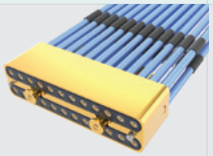
BULLS EYE® PRODUCT FAMILY FEATURES

The high-density array designs and advanced cabling solutions within Samtec's Bulls Eye® product family enable optimized performance to 70 GHz. A compression interface, small footprint and high cycle count make Bulls Eye® ideal for high-performance test applications.

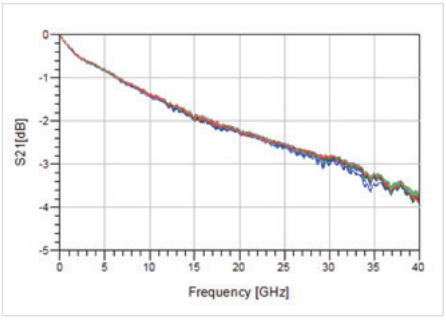
- Compression interface to the board provides easy on/off and eliminates soldering costs
- Small footprint design saves significant board space
- Microstrip or Stripline PCB transmission
- Assembly options: Dual Row (BE70A, BE40A, BDRA) and Quad Row (BQRA)
- Installation: While the attach process for each series is similar, each have unique specifications that need to be observed; contact RFTechnicalGroup@samtec.com

BULLSEYE® TEST POINT SYSTEM

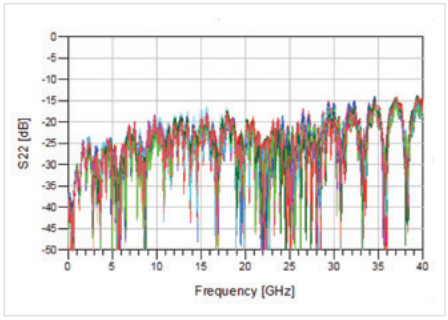
Product Family Cross Reference Guide

System	Bulls Eye® 70 GHz	Bulls Eye® 50 GHz		Bulls Eye® 20 GHz	
End 2 Options	**1.85 mm**	**2.40 mm** (50 GHz)	**2.92 mm** (40 GHz)	**2.92 mm** (2 Row)	**2.92 mm** (4 Row)
Samtec Series	BE70A	BE40A		BDRA	BQRA
Cable Type	.086	MWC-2350CU-01		MWC-2350-01	
Cable Management	Yes				
PCB Transition	Microstrip or Stripline			Stripline	
Ground	Spring-loaded outer contact on Bulls Eye® probe end	Pogo-pin design on Bulls Eye® probe end		Elastomer	
No. of Positions	2x 3, 4, 6, 8, 10, 12, 14, 16			2x 12	20
Impedance	50 Ω				
FPGA Development Kit		Xilinx® Zynq® UltraScale+™ RFSoC ZCU1275			Xilinx® Virtex® UltraScale™ FPGA VCU110
					

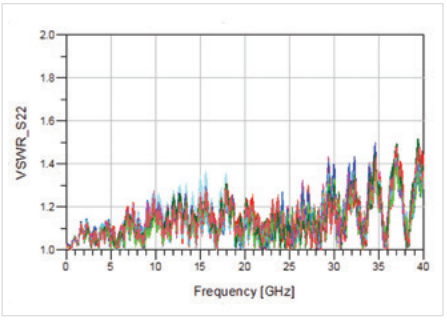
BULLS EYE® SPECIFICATIONS | Results for BE40A-S-92SP-5-2-12-0152



INSERTION LOSS



RETURN LOSS



VSWR

PRECISION RF
CABLE CONNECTORS

CABLE COMPONENTS • FREQUENCY TO 110 GHz • CUSTOMIZED SOLUTIONS

PERFORMANCE, PRECISION & QUALITY

Designed for a wide range of use in the microwave/ millimeter wave industry, Samtec's high-frequency cable connectors are manufactured with a precise tolerance interface to ensure superior repeatability and high mechanical stability.

PRECISION RF CABLE CONNECTOR FEATURES

RF microwave/millimeter wave precision interconnects offer the precision, quality and performance needed to move into the millimeter wave spectrum through 110 GHz.

- Samtec's line of precision cable connectors offers the flexibility to terminate to an industry-standard cable specified for your application
- High-frequency bands (DC to 110 GHz)
- 2.92 mm cross-mateable to other industry standards (SMA)
- 2.40 mm and 1.85 mm are intermateable
- 1.00 mm cable connectors up to 110 GHz
- Customized solutions available
- Visit samtec.com/RF for Samtec's full line of off-the-shelf RF solutions

PRECISION RF CABLE CROSS REFERENCE GUIDE

GHz	Type	Series	Industry Cable	Samtec Ref. No.
110	1.00 mm	PRF10	Temp-Flex 047	047
65	1.85 mm	PRF18	Temp-Flex 047	047
			Temp-Flex 085	085
	SMPM	PRFM0	Temp-Flex 047	047
			MWC-2350CU-01	
			Temp-Flex 085	085
50	2.40 mm	PRF24	Temp-Flex 085	085
			IW 1401	140
			IW 1501	150
			Dynawave DF150	155
			Semflex HP160	160
40	2.92 mm	PRF29	Temp-Flex 047	047
			Temp-Flex 085	085
			Semi-Rigid .085 LL	086
			Semi-Rigid 118	118
			Semflex HP120	120
			IW 1201	121
			Semi-Rigid .141	141
			Harbour LL142	142
			Dynawave DF140	145
			IW 1501	150
			Dynawave DF150	155
			Semflex HP160	160
			Semflex HP190	190
			MaxGain 200	200
	SMP	PRF00	Temp-Flex 047	047
			Semi-Rigid .085 LL	086
34	3.50 mm	PRF35	Temp-Flex 085	085
			Semflex HP120	120
			Semi-Rigid .141	141
			Semflex HP160	160
	SSMA	PRFS1	Temp-Flex 085	085

110 GHz | 1.00 mm

65 GHz | 1.85 mm & SMPM

50 GHz | 2.40 mm

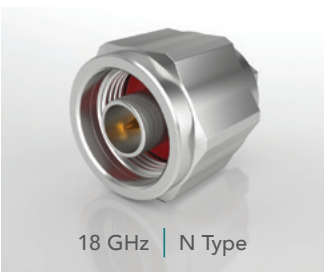
40 GHz | 2.92 mm & SMP

34 GHz | 3.50 mm

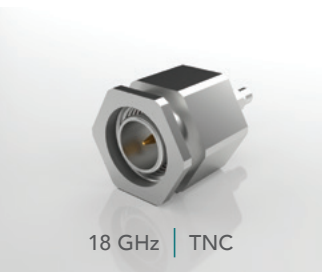
34 GHz | SSMA

GHz	Type	Series	Industry Cable	Samtec Ref. No.
18	SMA	PRF01	Temp-Flex 047	047
			Temp-Flex 085	085
			IW 1201	121
			Harbour LL120	122
			Semi-Rigid .141	141
			Harbour LL142	142
			Harbour SB142	143
			Dynawave DF140	145
			Dynawave DF150	155
			Semflex HP160	160
			Semflex HP190	190
			MaxGain 200	200
			Semflex LA290	290
			MaxGain 300	300
			Semflex HP305	305
			Harbour LL335	335
			Harbour LL335i	336
	N Type	PRF06	Semflex HP120	120
			Semi-Rigid .141	141
			Harbour LL142	142
			Harbour SB142	143
			Semflex HP190	190
			MaxGain 200	200
			Semflex LA290	290
			MaxGain 300	300
			Semflex HP305	305
			Harbour LL335	335
			Harbour LL335i	336
	TNC	PRF05	Harbour LL142	142
			Semflex HP190	190
			Semflex LA290	290
			Harbour LL335	335

18 GHz | SMA



18 GHz | N Type



18 GHz | TNC

PRECISION RF
BOARD & CABLE ASSEMBLIES

VERTICAL INTEGRATION • MATED SETS • INDUSTRY-LEADING SERVICE

TO 110 GHz, REPEATABILITY, TECH SUPPORT

Precision RF interconnects require precise, repeatable electrical and mechanical results. Samtec's microwave and Signal Integrity engineers have a complex understanding of each signal path connection; so you can trust Samtec RF interconnects will meet these demands every time.

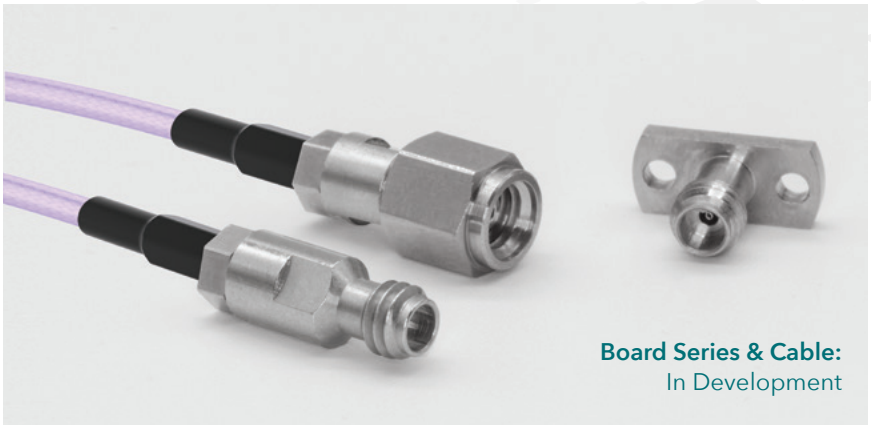
PRECISION RF BOARD & CABLE ASSEMBLY FEATURES

Full cable assemblies and board interconnects supporting microwave/millimeter wave technologies. Backed by the highest level of service and support in the industry.

- High-frequency bands (DC to 110 GHz)
- Offering full mated sets – board level interconnects and full cable assemblies
- Variety of solutions: 1.00 mm (110 GHz) to TNC (18 GHz), and adaptors
- Excellent repeatability & Low VSWR
- Highest level of service & support in the industry
- Customized solutions available
- Visit **samtec.com/RF** for Samtec's full line of off-the-shelf RF solutions

1.00 mm to 110 GHz • Excellent Repeatability

- Air dielectric design for low VSWR and insertion loss
- High-performance cable assemblies currently in development
- Excellent repeatability



Board Series & Cable: In Development

1.85 mm to 65 GHz • Intermateable with 2.40 mm

- Air dielectric design for low VSWR and insertion loss
- Rugged interface for consistent, reliable performance
- Intermateable with 2.40 mm

Board Series: 185 (In Development)

Cable: .047, .086

SMPM to 65 GHz • Miniature Footprint

- Push-on design for quick, easy mating
- 30% smaller than SMP
- Full detent or smooth bore for varying retention force needs
- Bullet adaptor for board-to-board blind mate applications
- Miniature footprint

Board Series: SMPM

Cable: .047, .086, MWC-2350CU-01

SMPM = 30% Smaller vs. SMP

PRECISION RF BOARD & CABLE ASSEMBLIES (CONTINUED)

2.40 mm to 50 GHz • Intermateable with 1.85 mm

- Air dielectric design for low VSWR and insertion loss
- Rugged interface for consistent, reliable performance
- Intermateable with 1.85 mm

2.92 mm to 40 GHz • Intermateable with 3.50 mm & SMA

- Air dielectric design for low VSWR and insertion loss
- Rugged interface for consistent, reliable performance
- Intermateable with 3.50 mm and SMA

SMP to 40 GHz • Compensates for Misalignment

- Push-on design for quick, easy mating
- Full detent or smooth bore for varying retention force needs
- Bullet adaptor for board-to-board blind mate applications
- Compensates for misalignment

3.50 mm to 34 GHz • Intermateable with 2.92 mm & SMA

- Air dielectric design for low VSWR and insertion loss
- Rugged interface for consistent, reliable performance
- Intermateable with 2.92 mm & SMA

SSMA to 34 GHz • Reduced Size for High-Density

- Air dielectric or PTFE design
- Reduced size for high-density
- 40 GHz extended frequency options available

SMA / N Type / TNC to 18 GHz • Extended Frequency Options

SMA

- For use where size, performance and cost are all critical factors
- Intermateable with 2.92 mm and 3.50 mm

N Type

- Robust interface environmental seal
- High power capability

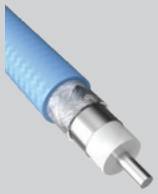
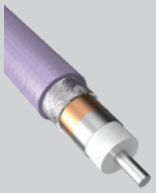
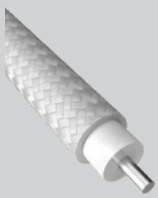
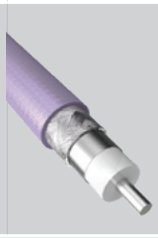
TNC

- Excellent voltage breakdown resistance
- Superior average power handling

Precision RF Adaptors Between Series • In-Series

- Between series and in-series adaptors available
- Designed for well-performing VSWR
- 1.00 mm, 1.85 mm, 2.40 mm, 2.92 mm, 3.50 mm, N Type, SMA, SMPM and TNC

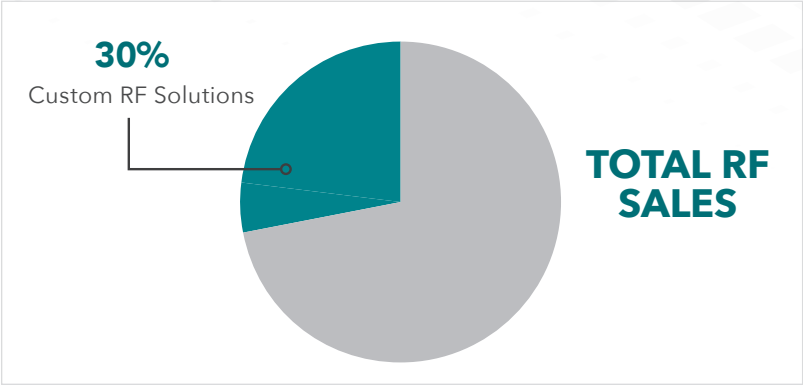
MICROWAVE CABLE SPECIFICATIONS

50 Ω MICROWAVE CABLES		MWC-2550-01	MWC-2350-01	MWC-2350CU-01	RG 405 (.086")	CCA-047-PFA (.047")	CCA-086-FFP (Low Loss .086")	CCA-130-FFP (Low Loss .141")
								
ELECTRICAL								
Max Frequency (GHz)		40	35	50	40	65	65	40
Insertion Loss (dB/m)	1 GHz	0.79	0.72	0.69	0.72	1.10	0.65	0.39
	26 GHz	3.80 @ 20 GHz	3.71 @ 20 GHz	4.21	4.26 @ 20 GHz	6.80	3.95	2.50
	40 GHz	—	—	5.55	—	8.80	5.07	3.19
	50 GHz	—	—	3.80	—	10.13	5.82	—
Propagation Delay (ns/m)		4.76	4.72	4.76	4.79	4.76	4.20	4.28
Velocity of Propagation		70%					79.4%	78%
Capacitance (pF/m)		96.80	95.45	97.80	104.97	95.00	83.37	85.47
CONSTRUCTION								
Center Conductor		Silver Plated Copper						
Dielectric		FEP			PTFE	PFA	Foam Fluoropolymer	
Shield		1) Silver Plated Copper 2) Silver Plated Copper		1) Silver Plated Copper 2) Copper Tape 3) Silver Plated Copper	Tinned Copper	1) Silver Plated Copper 2) Silver Plated Copper		
Jacket		FEP			—	FEP		
MECHANICAL								
Operating Temp		-40˚ C to 200˚ C		-65˚ C to 125˚ C	-40˚ C to 125˚ C	-65˚ C to 150˚ C		-65˚ C to 165˚ C
Min. Bend Radius (mm)		9.00	12.00	6.00	3.18	10.00	8.89	12.70
Termination Options		SMA, SMP	3.50 mm	2.92 mm, 2.40 mm	SMA, SMP	SMPM	1.85 mm, 2.40 mm, SMPM	2.92 mm

CUSTOM RF SOLUTIONS & SUPPORT

30% of total RF sales are in custom solutions: both quick-turn modifications and completely new application-specific designs.

Most of our custom solutions come with low or no NRE. We have experienced associates available to help solve application-specific challenges. This is why Samtec is consistently ranked #1 in the industry for willingness to modify a product.



QUICK-TURN MODIFICATIONS:

- Non-standard connector terminations on cables
- Custom tail lengths
- Right-angle height adjustment
- Alternate plating
- Heat-shrink tubing
- Termination type
- Custom labels

TECHNICAL SUPPORT:

- Design and fabrication
- Launch optimization, simulations, and test & measurement

Contact Samtec's RF Technical Group at RFTechnicalGroup@samtec.com to discuss your design needs.

MIX-AND-MATCH STANDARD CABLE ASSEMBLIES

Visit samtec.com/RF for Samtec's full line of off-the-shelf RF solutions, available with 24-hour samples and quotes, no minimum order quantity, and 2-to-5 day lead time for frequencies ≤ 20 GHz.

HIGH FREQUENCY MICROWAVE

Cable	End Options	Series
MWC–2350CU–01	2.92 mm, 2.40 mm	RF23C
MWC–2350–01	3.50 mm	RF23S
MWC–2550–01	SMA, SMP	RF25S
RG 405	SMA, SMP	RF405
RG 402	SMA	RF402
CCA-047-PFA	SMPM	RF047-2
CCA-086-FFP	2.40 mm, 1.85 mm, SMPM	RF086

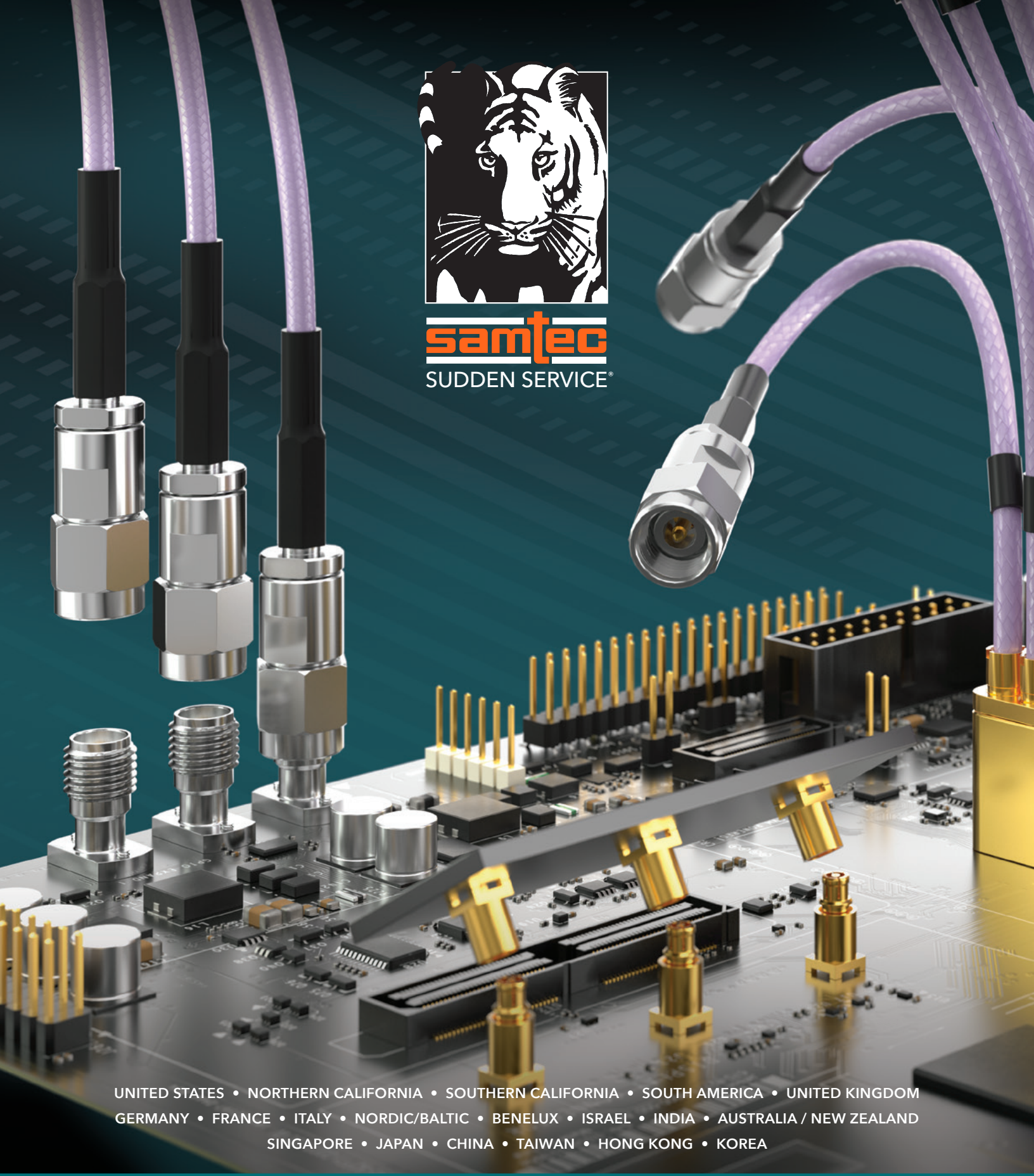
50 Ω RF CABLES

Cable	End Options	Series
0.81	MHF1, MHF3, SMA, MHF4	MH081
1.13	MHF1, SMA	MH113
CCA–047	HMHF1, SMA	RF047
RG 178	MMCX, MCX, SMA, SMB, BNC, TNC, N Type	RF178
RG 174	MMCX, MMCXV, MCX, SMA, SMB, BNC, TNC, N Type	RF174
RG 316	MMCX, MMCXV, MCX, SMA, SMB, BNC, TNC, N Type	RF316, IJ5C, IJ5H, GRF1–C, GRF1H–C
RG 58	SMA, TNC, N Type	RF058

75 Ω RF CABLES

Cable	End Options	Series
RG 179	MCX, MMCX7, SMB, BNC, DIN 1.0 / 2.3	RF179, GRF7–C, GRF7H–C
1855A	BNC, HD–BNC™, DIN 1.0 / 2.3	RFB8T
1694A		RFB6T
RG 6		RFA6T

Non-standard connector terminations are available on any cable.



UNITED STATES • NORTHERN CALIFORNIA • SOUTHERN CALIFORNIA • SOUTH AMERICA • UNITED KINGDOM
GERMANY • FRANCE • ITALY • NORDIC/BALTIC • BENELUX • ISRAEL • INDIA • AUSTRALIA / NEW ZEALAND
SINGAPORE • JAPAN • CHINA • TAIWAN • HONG KONG • KOREA