RF Solutions

for the Automotive Market

With recent advancements in communications technology and increased consumer demand for a diverse array of on-board telematics services, RF communications systems have become indispensable components of the modern automobile.

To keep RF interconnection costs low and ensure high levels of electrical and mechanical performance for telematics applications such as Global Positioning Satellite, Satellite Radio, Vehicular Internet Access, Remote vehicle diagnostics and Bluetooth, the German and American automotive industries have standardized a high-performing, cost-effective RF connector based on the FAKRA and USCAR standards.

Utilizing a standard metal SMB connector embedded within a plastic housing that can be designed with multiple colored codes for easy identification, FAKRA connectors are designed to perform up to 4 GHz and meet the particular mechanical and environmental requirements of the automobile industry.

Amphenol RF's industry leading product line meets both the FAKRA and USCAR standards with the following features:

- 13 different mechanical and color codes
- Plastic housing with locking feature and audible clicking noise
- Minimum of 100 mating cycles
- Frequency range of DC - 4 GHz
- Usable on multiple coaxial cables (RG-58, RG-174, RG-316, RG-178 and other micro-cables)
- Available in numerous connector configurations (straight and right angle solutions for cable applications, as well as edge-launch and PCB designs)

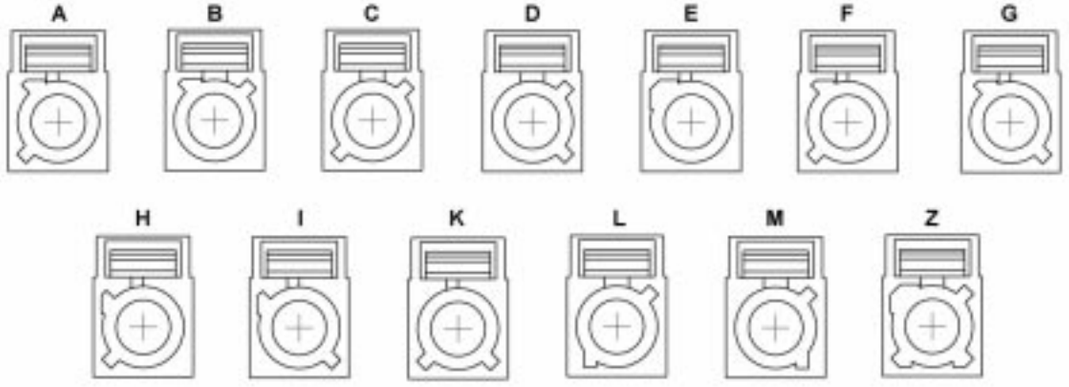
Along with the growth of RF connection devices in the car, the need for coaxial cable has grown to a level which could require twice the amount of cable which goes into a home (over 100+ feet per car). To meet this demand, Amphenol's Times Fiber Cable division has developed a portfolio of cable products to meet the needs of the automotive industry. TFC's automotive cables are manufactured utilizing the highest quality materials and workmanship available:

- Lowest Signal Loss
- Multiple Shielding Options Available
- 100 % Quality Testing – Electricals, Physicals
- Superior TFC/Amphenol Product Development

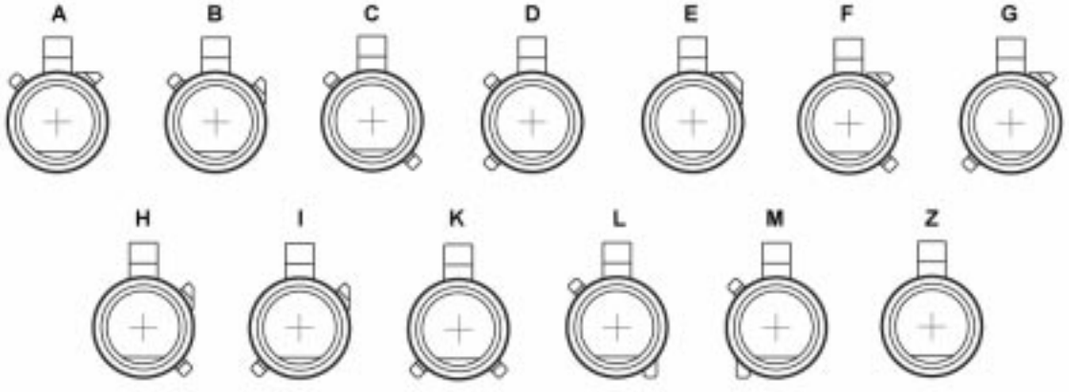
Mechanical and Color Coding

Coding	Rib Combination	Color	Similar RAL No.
A	A-B1	Deep Black	9005
B	A - B2	Signal White	9003
C	A - C	Signal Blue	5005
D	A - D	Bordeaux Violet	4004
E	B1 - B2	Leaf Green	6002
F	B1 - C	Brown	8011
G	B1 - D	Blue Grey	7031
H	B2 - C	Heather Violet	4003
I	B2 - D	Beige	1001
K	C - D	Curry Yellow	1027
L	A - E	Dahlia Yellow	1033
M	A - F	Pastel Green	6019
Z	Neutral Coding	Water Blue	5021

Female FAKRA Housings



Male FAKRA Housings



Amphenol RF FAKRA Part Numbering System Overview

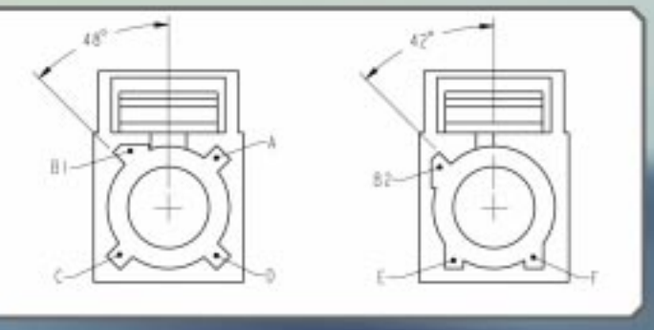
Single Series - FA1

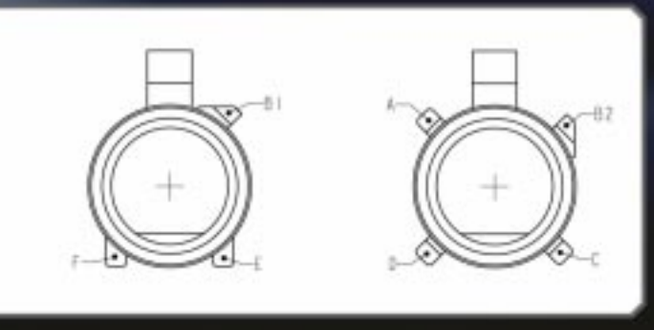
F	A	1	-	N	X	S	P	-	C	*	*	-	#
Series				Tab Location North South East West	Keying Codes	Style **S**traight **R**ight Angle	Gender **P**(Male) **J**(Female)		Attachment				Special
									C	**#**	**#**		
									P	**C**	**B**		

Dual Series - FA2

F	A	2	-	N	X	S	P	-	C	*	*	-	#
	Series			Tab Location North South East West	Keying Codes	Style **S**traight **R**ight Angle	Gender **P**(Male) **J**(Female)		Attachment				Special
									C	**#**	**#**		
									P	**C**	**B**		

	Cable Group Codes
00	RG-58/RG-174 Combo Design
01	RG 174, 188, 316
04	RG 58, 141
09	Cables with .057 OD
10	RG-178, .071 OD Cables
13	RG-174 LL Cable

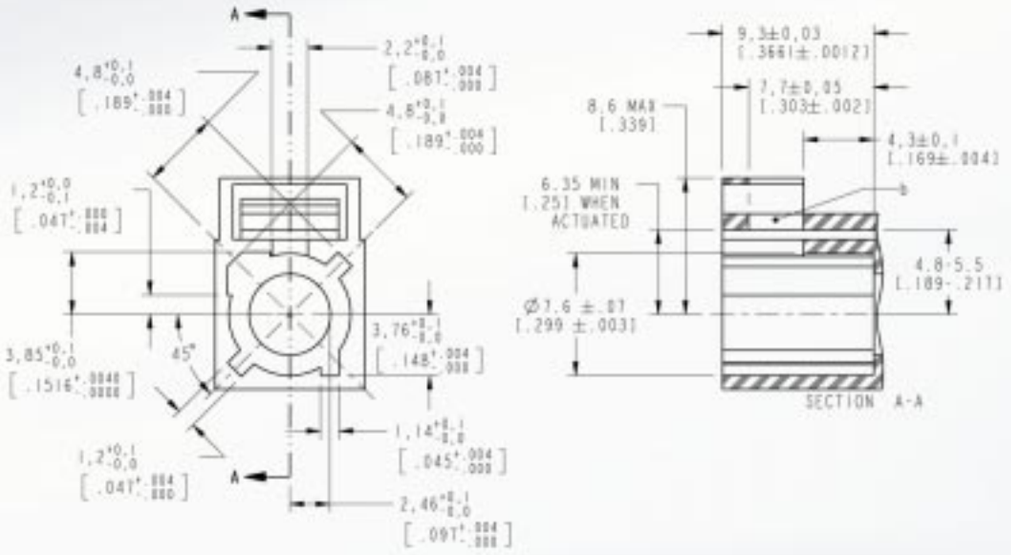




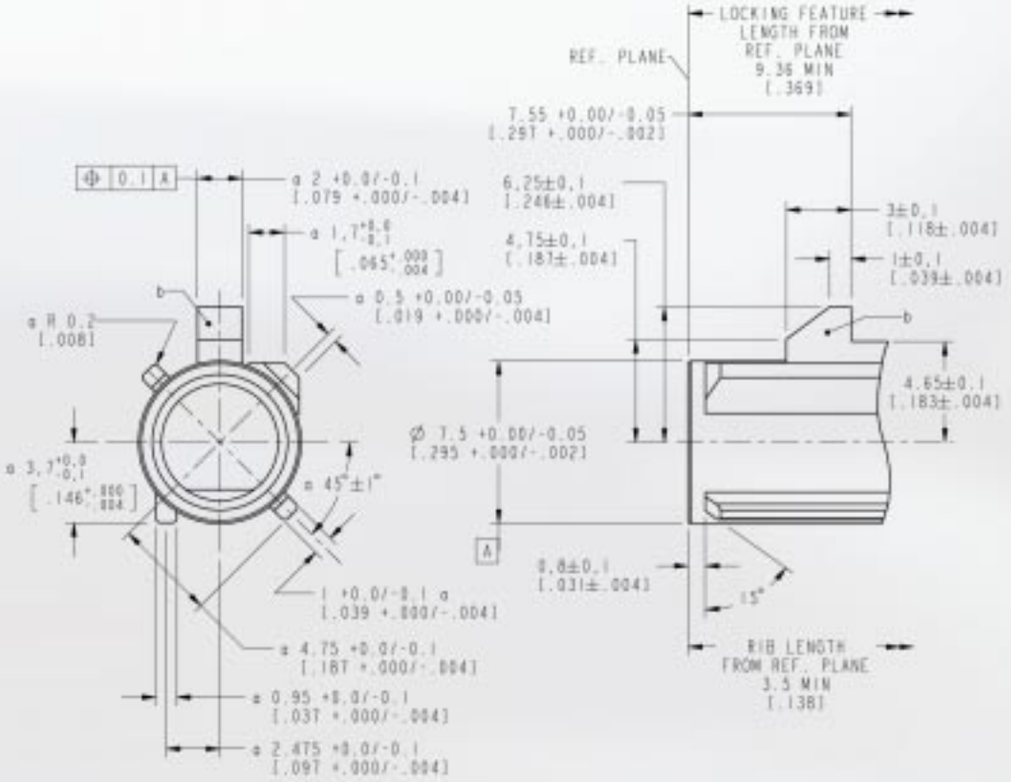
FAKRA SMB Product Specifications

ELECTRICAL			
Impedance		50 Ω	
Frequency Range		DC - 4 GHz	
Performance Spec		SAE/USCAR-17	
V.S.W.R.		DC - 2 GHz	2 GHz - 4 GHz
	spec requirement	1.40 max.	1.50 max.
	straight SMB male and female(cable group 1)	1.15 max.	1.25 max.
	R/A SMB male and straight female(cable group 1)	1.20 max.	1.35 max.
	straight SMB male and female(cable group 4)	1.10 max.	1.15 max.
Insertion Loss	*spec requirement*	< .3 dB max from DC - 3 GHZ	
	up to 1 GHz	< .1 dB	
	up to 2 GHz	< .2 dB	
	up to 4 GHZ	< .3 dB	
Insulation Resistance		1000 M Ω min	
Center Contact Resistance	*center contact*	< 20 mΩ	
	outer contact	< 10 mΩ	
Dielectric Withstanding Voltage	*at sea level*	> 1000 VRMS	
MECHANICAL			
Durability (matings)		100 min	
Plastic Housing - Engagement Force		≤ 20 N	
Plastic Housing - Disengagement Force		≥ 25 N	
Cable Retention Force	*cable group 1*	≥ 110 N	
	cable group 4	≥ 180 N	
Coding		13 mechanical and colored codings	
ENVIRONMENTAL			
Temperature Range	*operating*	-40 / +115° C	
Thermal Shock		MIL-STD-202, Method 107, Cond. B (-55 / +125° C)	
Vibration		MIL-STD-202, Method 204, Cond. B (15g)	
Shock		MIL-STD-202, Method 213, Cond. B (75g, 6 ms, 1/2 sine)	
MATERIALS			
Plastic Housing		PBT w/ 15% Glass Fiber	
Secondary Locking Clip		PBT w/ 15% Glass Fiber	
Center Contact	*female*	Beryllium Copper	
	male	Brass	
Body		Brass	
Barrel		Brass	
Retainer Ring		Beryllium Copper	
Ferrule		Copper	
Insulator		TFE	
PLATING			
Center Contact		Gold	
Body		Nickel	
Barrel		Nickel	
Ferrule		Nickel	

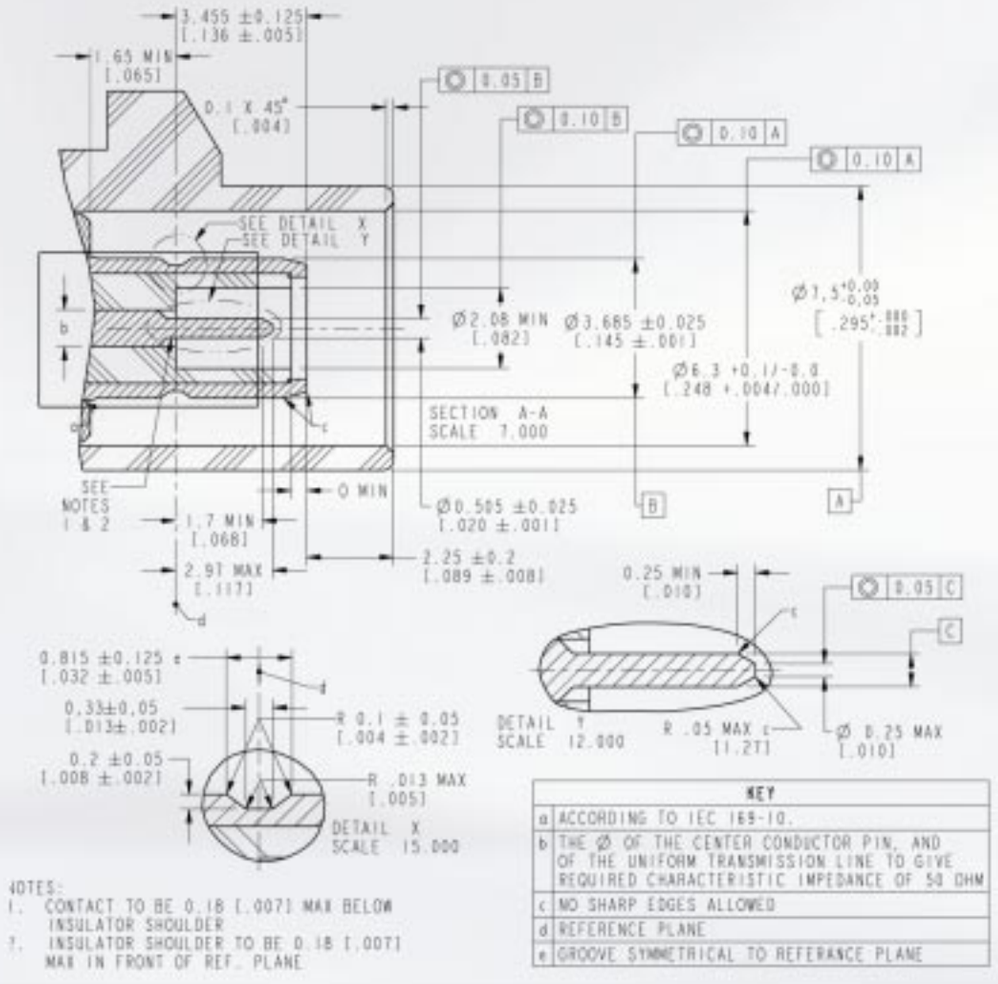
Female(J) FAKRA Interface Specifications



Male(P) FAKRA Interface Specifications



Male(P) FAKRA Detailed Interface Specifications



KEY	
a	ACCORDING TO IEC 169-10.
b	THE Ø OF THE CENTER CONDUCTOR PIN, AND OF THE UNIFORM TRANSMISSION LINE TO GIVE REQUIRED CHARACTERISTIC IMPEDANCE OF 50 OHM
c	NO SHARP EDGES ALLOWED
d	REFERENCE PLANE
e	GROOVE SYMMETRICAL TO REFERANCE PLANE

NOTES:
1. CONTACT TO BE 0.18 [.007] MAX BELOW INSULATOR SHOULDER
2. INSULATOR SHOULDER TO BE 0.18 [.007] MAX IN FRONT OF REF. PLANE

Recommended Tooling (Daniels Manufacturing)

	RG-174, RG-316, Cables			RG-58		
	Center Pin	Ferrule (Single)	Ferrule (Dual)	Center Pin	Ferrule (Single)	Ferrule (Dual)
Hand Crimp Tool	AFM8	HX4	HX4	AFM8	HX4	HX4
Pneumatic Crimp Tool	WA22	HX23	HX23	WA22	HX23	HX23
Die Set (Positioner)	K727	Y119 or Y1831	Y1831	K1470	Y188 or Y1832	Y1832
Depth Setting	4	-	-	6 or 7	-	-

Please note: The dual ferrule die sets can be used on the single ferrule designs.