# **Detailed Specifications & Technical Data**



### ENGLISH MEASUREMENT VERSION

## 9688 Multi-Conductor - Type 1A



For more Information please call

1-800-Belden1



### **General Description:**

IBM Type 1A, 22 AWG solid BC conductors, non-plenum, flame-retardant foam polyethylene insulation, each pair individually Beldfoil® shield (65% coverage), rip cord, PVC jacket.

Usage (Overall)				
Suitable Applications:	Token Ring 4 & 16 Mbps, FDDI over Copper, and video			
Physical Characteristics (Overall)				
Conductor				
AWG: # Pairs AWG Stranding Conductor Material				
2 22 Solid BC - Bare Copper				
Total Number of Conductors:	4			
Insulation				
Insulation Material Insulation Material				
FRFPE - Flame Retardant Foam Polyethylene				
Insulation Resistance:	> 16000 Megaohms			
Inner Shield				
Inner Shield Material: Inner Shield Trade Name Type Inner Shield Material C	Coverage (%)			
Beldfoil®   Tape   Aluminum Foil-Polyester Tape   1				
Outer Shield				
Outer Shield Material:				
Type         Outer Shield Material         Coverage (%)           Braid         TC - Tinned Copper         65				
Outer Jacket				
Outer Jacket Material Outer Jacket Material				
PVC - Polyvinyl Chloride				
Outer Jacket Ripcord:	Yes			
Overall Cable				
Overall Nominal Diameter:	0.296 x 0.431 in.			
Pair Pair Color Code Chart:				
Number Color				
1 Black & Orange				
2 Red & Green				
Mechanical Characteristics (Overall)				
Operating Temperature Range:	-40°C To +75°C			
Bulk Cable Weight:	48 lbs/1000 ft.			
Max. Recommended Pulling Tension:	83 lbs.			
Min. Bend Radius/Minor Axis:	4.500 in.			
Min. Bend/Installation:	4.500 in.			
Applicable Specifications and Agency Compliance (	Overall)			
Applicable Standards & Environmental Programs				
NEC/(UL) Specification:	CMG, MPG			
CEC/C(UL) Specification:	СМС			

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## 9688 Multi-Conductor - Type 1A

EU Directive 2011/65/EU (ROHS II):			
IEEE Specification:	IEEE802.5 Token Ring		
EU CE Mark:	Yes		
EU Directive 2000/53/EC (ELV):	Yes		
EU Directive 2002/95/EC (RoHS):	Yes		
EU RoHS Compliance Date (mm/dd/yyyy):	01/01/2004		
EU Directive 2002/96/EC (WEEE):	Yes		
EU Directive 2003/11/EC (BFR):	Yes		
CA Prop 65 (CJ for Wire & Cable):	Yes		
MII Order #39 (China RoHS):	Yes		
Other Specification:	Verified IBM Type 1A		
Customer Part Number Reference Specification:	IBM P/N: 4716748, 33G2772		
Flame Test			
UL Flame Test:	UL1685 FT4 Loading		
CSA Flame Test:	FT4		
Plenum/Non-Plenum			
Plenum (Y/N):	No		
Plenum Number:	82688		
Surface Printing (Overall)			
Electrical Characteristics (Overall)			
Nom. Characteristic Impedance:			
Impedance (Ohm)			
150			
Nom. Capacitance Conductor to Conductor:			
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft)			
Nom. Capacitance Conductor to Conductor:			
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft)	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m):	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%)	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance:	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft)	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation:	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 10.0	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation:	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8	100		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8 100 12.3	100		
Nom. Capacitance Conductor to Conductor:           Capacitance (pF/ft)           8.5           Maximum Capacitance Unbalance (pF/100 m):           Nominal Velocity of Propagation:           VP (%)           78           Nom. Conductor DC Resistance:           DCR @ 20°C (Ohm/1000 ft)           16.7           Max. Attenuation:           Freq. (MHz) Attenuation (dB/100 m)           4         2.2           16         4.4           31.25         6.9           62.5         9.8           100         12.3           200         17.4	10		
Nom. Capacitance Conductor to Conductor:           Capacitance (pF/ft)           8.5           Maximum Capacitance Unbalance (pF/100 m):           Nominal Velocity of Propagation:           VP (%)           78           Nom. Conductor DC Resistance:           DCR @ 20°C (Ohm/1000 ft)           16.7           Max. Attenuation:           Freq. (MHz) Attenuation (dB/100 m)           4         2.2           16         4.4           31.25         6.9           62.5         9.8           100         12.3           200         17.4           300         21.4	10		
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8 100 12.3 200 17.4 300 21.4 Max. Operating Voltage - UL:			
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8 100 12.3 200 17.4 300 21.4 Max. Operating Voltage - UL: Voltage	100		
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         YP (%)         78         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MH2) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4	10		
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         YP (%)         78         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MH2) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4         Max. Operating Voltage - UL:       Voltage         300 V RMS       Max. Recommended Current:			
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         VP (%)         73         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MH2) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4    Max. Operating Voltage - UL:          Voltage       300 V RMS         Max. Recommended Current:       Current			
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: VP (%) 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8 100 12.3 200 17.4 300 21.4 Max. Operating Voltage - UL: Voltage 300 V RMS Max. Recommended Current: Current 2.3 Amps per conductor @ 25°C			
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         VP (%)         78         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MHz) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4         Max. Accommended Current:         Voltage 300 V RMS         Wax. Recommended Current:         2.3 Amps per conductor @ 25°C         Common Mode Attenuation:			
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: $VP \left( \frac{\gamma}{2} \right)$ 78 Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation Preq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8 100 12.3 200 17.4 300 21.4 Max. Operating Voltage - UL: Voltage 300 V RMS Max. Recommended Current: Current 2.3 Amps per conductor @ 25°C			
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         VP (%)         78         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MHz)         Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4         Max. Operating Voltage - UL:         Voltage 300 V RMS         Max. Recommended Current:         Current 2.3 Amps per conductor @ 25°C         Common Mode Attenuation:         Freq. (MHz) Attenuation (dB/100 m)			
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         VP (%)         73         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MHz) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4         Max. Recommended Current:         Voltage 300 V RMS         Max. Recommended Current:         2.3 Amps per conductor @ 25°C         Common Mode Attenuation:         Freq. (MH2) Attenuation (dB/100 m)         62.5       10.6			
Nom. Capacitance Conductor to Conductor: Capacitance (pF/ft) 8.5 Maximum Capacitance Unbalance (pF/100 m): Nominal Velocity of Propagation: $VP \binom{0}{78}$ Nom. Conductor DC Resistance: DCR @ 20°C (Ohm/1000 ft) 16.7 Max. Attenuation: Freq. (MHz) Attenuation (dB/100 m) 4 2.2 16 4.4 31.25 6.9 62.5 9.8 100 12.3 200 17.4 300 21.4 Max. Operating Voltage - UL: Voltage 300 V RMS Max. Recommended Current: Current 2.3 Amps per conductor @ 25°C Common Mode Attenuation $\frac{Freq. (MHz) Attenuation (dB/100 m)}{62.5 10.6}$ 100 13.4 200 19.0 300 23.3			
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft) $8.5$ Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation: $\sqrt{P}$ (%) $73$ Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MH2) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4         Max. Operating Voltage - UL:       Voltage         Voltage       300 V RMS         Max. Recommended Current:       Current         2.3 Amps per conductor @ 25°C       200         Cournon Mode Attenuation:       Freq. (MH2) Attenuation (dB/100 m)         62.5       10.6         100       13.4         200       19.0         300       23.3         400       26.9			
Nom. Capacitance Conductor to Conductor:         Capacitance (pF/ft)         8.5         Maximum Capacitance Unbalance (pF/100 m):         Nominal Velocity of Propagation:         YP (%)         78         Nom. Conductor DC Resistance:         DCR @ 20°C (Ohm/1000 ft)         16.7         Max. Attenuation:         Freq. (MH2) Attenuation (dB/100 m)         4       2.2         16       4.4         31.25       6.9         62.5       9.8         100       12.3         200       17.4         300       21.4         Max. Operating Voltage - UL:       Voltage         300 V RMS       Max. Recommended Current:         2.3 Amps per conductor @ 25°C       Common Mode Attenuation:         Freq. (MH2) Attenuation (dB/100 m)       62.5         62.5       10.6         100       13.4         200       19.0         300       23.3			



## 9688 Multi-Conductor - Type 1A

#### **Electrical Characteristics-Premise (Overall)**

Premise Minimum NEXT:

Freq. (MHz)	NEXT (dB)			
4	58.0			
16	50.4			
31.25	46.1			
62.5	41.5			
100	38.5			
200	34.0			
300	31.3			

#### Notes (Overall)

Notes: IBM qualified Type 1A media cable for use in IBM cabling system. For non-suffix "A" type IBM product, see 1634A

#### Put Ups and Colors:

Item #	Putup	Ship Weight	Color	Notes	Item Desc
9688 0101000	1,000 FT	50.000 LB	BLACK	CZ	2PR#22FRFPE FRPE BRD PVC
9688 0102000	2,000 FT	100.000 LB	BLACK	CZ	2PR#22FRFPE FRPE BRD PVC
9688 0103600	3,600 FT	190.800 LB	BLACK	CZ	2PR#22FRFPE FRPE BRD PVC
9688 010500	500 FT	26.500 LB	BLACK	CZ	2PR#22FRFPE FRPE BRD PVC

#### Notes:

C = CRATE REEL PUT-UP

2 = FINAL PUT-UP LENGTH MAY VARY (+ OR -) 10% FOR SPOOLS OR REELS AND(+ OR -) 5% FOR UNREEL CARTONS FROM LENGTH SHOWN.

Revision Number: 2 Revision Date: 01-18-2013

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product. Belden declares this product to be in compliance with EU LVD (Low Voltage Directive 73/23/EEC), as amended by directive 93/68/EEC.