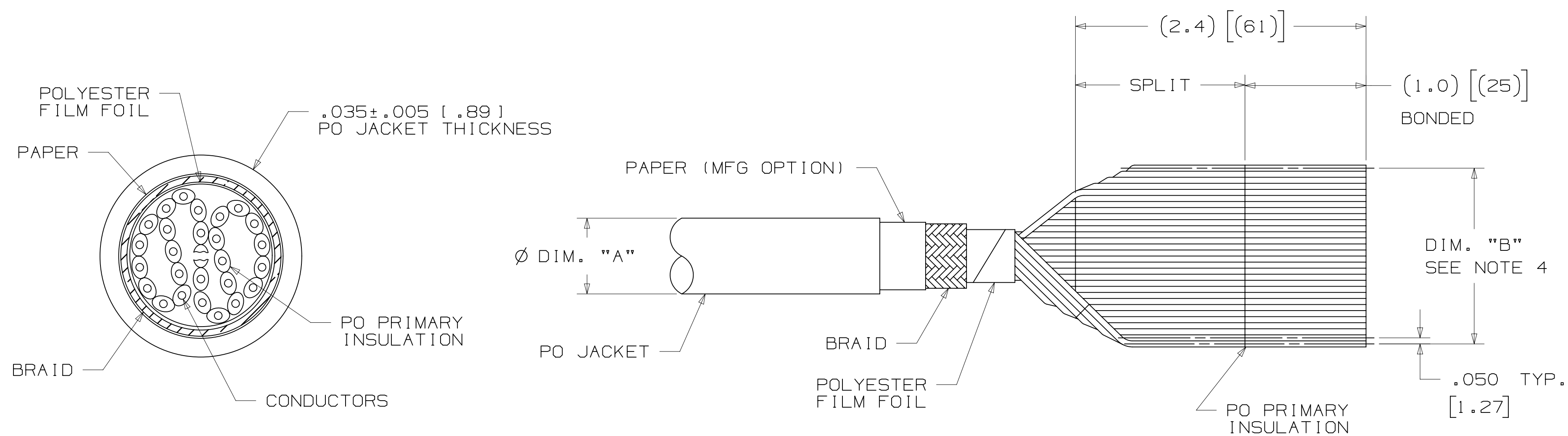


# 3M™ ROUND SHIELDED/JACKETED, FLAT CABLE, HF659 SERIES

.050" 28 AWG STRANDED, MASS TERMINATABLE, HALOGEN FREE PO/PO



- \* LOW SMOKE ZERO HALOGEN (LSZH) INSULATION. ADVANTAGES OF LSZH INSULATION ARE THE LOW SMOKE (IEC 61034-2-2005) AND LOW TOXICITY OF COMBUSTION GASES (NF X 70-100-2-2006), REDUCING THE RISK TO FIREFIGHTERS AND REDUCING THE SOOT AND CORROSION DAMAGE TO NEARBY EQUIPMENT.
- \* ROUND CONSTRUCTION PERMITS MORE EASY ROUTING.
- \* 28 AWG WIRE ON .050 INCH CENTERS PERMITS MASS TERMINATION TO BROAD LINE OF IDC CONNECTORS.
- \* CONTINUOUS SPLIT/BOND REPEAT ALLOWS FOR MASS TERMINATIONS OF IDC CONNECTORS.
- \* DUAL SHIELDING PROVIDES 35 dB AVERAGE SHIELDING.
- \* PRIMARY CABLE IS ZIPPABLE FOR BRANCHING OR DISCRETE TERMINATION.

- NOTES
1. REGULATORY INFORMATION: VISIT 3M.com/regs OR CONTACT YOUR 3M REPRESENTATIVE TO FIND THE RoHS COMPLIANCE STATUS OF THE 3M PART YOU ARE INTERESTED IN.
  2. IN THE EVENT OF CONFLICT BETWEEN THIS DATA AND THAT CONTAINED IN THE PRODUCT SPECIFICATION, THE PRODUCT SPECIFICATION TAKES PRECEDENT.
  3. BLUE MARKING ON ONE EDGE OF PRIMARY CABLE DESIGNATES WIRE #1.
  4. DIMENSION "B" PERTAINS TO BONDED AREA ONLY.

## ORDERING INFORMATION

HF659/XX XX XX

NUMBER OF CONDUCTORS (SEE TABLE 1)

BLANK = STANDARD  
SF = SPLICE FREE

BLANK = STANDARD  
SO = CONTINUOUSLY BONDED WIRE (NO SPLIT)

NOTE:  
AVAILABLE IN STANDARD 275FT ROLLS. CONTACT 3M FOR AVAILABILITY OF ADDITIONAL CONDUCTOR COUNTS AND/OR CUSTOM ROLL LENGTHS.

### 2 PHYSICAL :

JACKET MATERIAL: HALOGEN FREE POLYOLEFIN (PO)  
COLOR: DARK GRAY  
PRIMARY MATERIAL: HALOGEN FREE POLYOLEFIN (PO)  
COLOR: DARK GRAY

MARKING: NONE  
STANDARD: NONE  
CONDUCTORS: 28 AWG, 7 X 36 AWG (7 X Ø .127) TINNED STRANDED COPPER  
SHIELDING: .001 [ .03 ] THICK ALUMINUM/POLYESTER FILM FOIL AND 90% COVERAGE TINNED COPPER BRAID.

### 2 ELECTRICAL :

VOLTAGE RATING: USA 150V CANADIAN 150V EU: <50V  
INSULATION RESISTANCE: (PRIMARY CABLE) >1 X 10<sup>10</sup>Ω/10ft. [ 3m ]

CHARACTERISTIC	UNBALANCED		BALANCED	
	IMPEDANCE	CAPACITANCE	IMPEDANCE	CAPACITANCE
CHARACTERISTIC IMPEDANCE:	54Ω	28.7 pF/ft [ 84.2 pF/m ]	107Ω	14.4 pF/ft [ 47.2 pF/m ]
INDUCTANCE:	.08μH/ft [ .27μH/m ]		.16μH/ft [ .52μH/m ]	
PROPAGATION DELAY:	1.55 ns/ft [ 4.95 ns/m ]		1.54 ns/ft [ 4.95 ns/m ]	
VELOCITY OF PROPAGATION:	66%		66%	

NOTE: UNBALANCED IS MEASURED BETWEEN GROUND-SIGNAL-GROUND CONDUCTORS.  
BALANCED IS MEASURED BETWEEN CONDUCTORS WITHIN A PAIR.  
"MEASURED VALUES ARE TYPICAL"

### 2 ENVIRONMENTAL :

TEMPERATURE RATING: -40°C TO +105°C (EIA-364-32G, METHOD A, TEST CONDITION 2)  
-15°C TO +75°C (UL TEMPERATURE RATING)

FLAMMABILITY RATING: INTERNAL: HORIZONTAL FLAME PER UL758  
EXTERNAL: CABLE FLAME (VERTICAL) PER UL758

HALOGEN FREE IS DEFINED AS BOTH 1) NO HALOGEN COMPOUNDS THAT ARE INTENTIONALLY ADDED TO THE PRODUCT OR USED IN THE MANUFACTURING PROCESS FOR THE PRODUCT AND 2) ANY IMPURITIES PRESENT ARE LESS THAN 900ppm BROMINE, LESS THAN 900ppm CHLORINE AND/OR LESS THAN 1500ppm TOTAL BROMINE AND CHLORINE. THE LATTER ARE THE LEVELS SET FORTH IN CERTIAN INDUSTRY STANDARDS FOR PRINTED CIRCUIT BOARDS, SUCH AS THE INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC) 61249-2-21 STANDARDS. THIS INFORMATION REPRESENTS 3M'S KNOWLEDGE AND BELIEF WHICH MAY BE BASED IN WHOLE OR IN PART ON INFORMATION PROVIDED BY 3RD PARTY SUPPLIERS TO 3M.

NO. OF CONDUCTORS	3M PART NUMBER	DIM. "A"	DIM. "B"
09	HF659/09	.25 [ 6.4 ]	.40 [ 10.2 ]
10	HF659/10	.25 [ 6.4 ]	.45 [ 11.4 ]
14	HF659/14	.30 [ 7.6 ]	.65 [ 16.5 ]
15	HF659/15	.30 [ 7.6 ]	.70 [ 17.8 ]
16	HF659/16	.30 [ 7.6 ]	.75 [ 19.1 ]
20	HF659/20	.33 [ 8.4 ]	.95 [ 24.1 ]
24	HF659/24	.34 [ 8.6 ]	1.15 [ 29.2 ]
25	HF659/25	.34 [ 8.6 ]	1.20 [ 30.5 ]
26	HF659/26	.34 [ 8.6 ]	1.25 [ 31.8 ]
30	HF659/30	.37 [ 9.4 ]	1.45 [ 36.8 ]
34	HF659/34	.37 [ 9.4 ]	1.65 [ 41.9 ]
36	HF659/36	.41 [ 10.4 ]	1.75 [ 44.5 ]
37	HF659/37	.41 [ 10.4 ]	1.80 [ 45.7 ]
40	HF659/40	.41 [ 10.4 ]	1.95 [ 49.5 ]
50	HF659/50	.45 [ 11.4 ]	2.45 [ 62.2 ]
60	HF659/60	.48 [ 12.2 ]	2.95 [ 74.9 ]
64	HF659/64	.48 [ 12.2 ]	3.15 [ 80.0 ]

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UL FILE NO: E42769,  
UL STYLE NO: 22170

INCH [ MM ]		
TOLERANCE - UNLESS NOTED		
.X	.XX	.XXX
[ INCH ] ±.1	±.05	±.010
[ ] = DIM. FOR REFERENCE ONLY		

DESIGN REFERENCE	NEXT ASSEMBLY	REV	ECO	ISSUE DATE AND DESCRIPTION	DRFT	CHKD
		F	86110	AUG 19, 2019 REVISE NOTES	JNC	SAN
		E	80157	AUG 01, 2018 REVISED ELECTRICAL & ENVIRONMENTAL NOTES	JNC	BM
		D	79295	MAY 29, 2018 REVISED AND REDRAWN	JNC	BM
		REV	ECO	ISSUE DATE AND DESCRIPTION	DRFT	CHKD
		CHKD	CASTIGLIONE	MAY 29, 2018		
		APPR	B. MIZE	MAY 29, 2018		
DIVISION	DIVISION CODE					
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THIRD ANGLE PROJECTION	INTERPRET PER ASME Y14.5 - 2009	INCHES	<p>RD SHIELDED/JACKETED, FLAT CABLE, HF659 SERIES</p>			
MAX SURFACE ROUGHNESS	MAX SURFACE ROUGHNESS	MILLIMETERS	CAGE NUMBER	SIZE	DRAWING NO.	REV.
✓ MARKED ONLY	✓ MARKED ONLY	ANGLES	D		78-5100-2335-7	F
			MODEL		HF659	
			DEF		ISTS	YES X NO
					SHT	1 OF 2

8 7 6 5 4 3 2 1  
**3M™ ROUND SHIELDED/JACKETED, FLAT CABLE, HF659 SERIES**  
 .050" 28 AWG STRANDED, MASS TERMINATABLE, HALOGEN FREE PO/PO

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DESIGN REFERENCE	NEXT ASSEMBLY	REV	ECO	ISSUE DATE AND DESCRIPTION	DRFT	CHKD
REV	ECO	ISSUE DATE AND DESCRIPTION	DRFT	CHKD		
DRW	DATE	MFG	DATE			
CHKD	DATE	APPRV	DATE			
		B. MIZE	MAY 29, 2018			
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THIRD ANGLE PROJECTION	INCHES	MILLIMETERS	CAGE NUMBER	SIZE	DRAWING NO.	REV.
INTERPRET PER ASME Y14.5 - 2009	.00 ±	0 ±	D		78-5100-2335-7	F
MAX SURFACE ROUGHNESS	.000 ±	.00 ±	MODEL	DATE	DET	SHT 2 OF 2
MARKED SURFACES	.000 ±	0 ±	HF659		ISTs	
MARKED ONLY	ANGLES					

F REVISION  
 78-5100-2335-7 DRAWING NUMBER  
 B  
 A Time 8/28/2019 -- UTC  
 Off-set (hrs) 6