1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Electrical, Rectangular, Microminiature Connectors with Non-Removable Crimp-type Contacts and their associated insulated wires and uninsulated solid wires, based on type MDM.

It shall be read in conjunction with:

(a) ESCC Generic Specification No. 3401, Connectors, Electrical, Rectangular and Circular.
(b) ESCC Detail Specification No. 3401/032, Accessories for Connectors, Microminiature, 3401/029, 3401/077 and Connector Savers 3401/041.

the requirements of which are supplemented herein.

1.2 RANGE OF COMPONENTS

The different sizes of the basic type connectors specified herein, which are also covered by this specification, together with their mechanical characteristics, are scheduled in Table 1(a). The different sizes of associated insulated wires and uninsulated solid wires are given in Figure 2.

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the connectors specified herein, are given in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

The derating information applicable to the contacts specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

The physical characteristics of the connectors, insulated wires and uninsulated solid wires specified herein are shown in Figure 2.

1.6 CONTACT ARRANGEMENTS

Contact arrangements are shown in Figure 3.

2. APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

(a) ESCC Generic Specification No. 3401, Connectors, Electrical, Circular and Rectangular.
(b) ESCC Detail Specification No. 3401/032, Accessories for Connectors, Microminiature, 3401/029, 3401/077 and Connector Savers 3401/041.
(c) ESCC Detail Specification No. 3901/002, Polyimide Insulated Wires and Cables, Low Frequency, 600V, -100 to +200°C.
(d) ESCC Detail Specification No. 3901/013, PTFE Insulated Wires and Cables, 600V, -100 to +200°C.
(e) QQ-W-343, Wires electrical Uninsulated.
(f) MIL-G-45204, Gold Plating, Electro-deposited.
(g) MIL-C-14550, Copper Plating, Electro-deposited.
(h) MIL-PRF-83513, Connectors Electrical, Rectangular, Microminiature, Polarised Shell, Generic

Add ESCC 23500.

Specification for.

3. **TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS**

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

2 NEW COLUMNS FOR GMR 7580 & GMR 7590 (SEE NEXT PAGE)

TABLE 1(a) - RANGE OF COMPONENTS

Variants		Shell Size	Weight Max g				Mating Force N Max	Unmating Force	
Shell Finish			FR112 to FR116 FR112A to FR116A FR123 and FR123A (1)	FR136 (2)	FR136A (2)	FR139 (2)		N Max	N Min
Nickel	Gold								
01	02	9	2.2	7.4	7.4	4.6	20	20	1.3
01	02	15	3	7.8	N/A	5	33	33	2
01	02	21	3.8	8.5	N/A	5.4	47	47	2.9
01	02	25	4.3	10.2	N/A	6.5	55	55	3.5
01	02	31	5.1	12.2	N/A	7.7	69	69	4.3
01	02	37	5.9	14.4	N/A	9.2	82	82	5.1
01	02	51	7.2	16.5	N/A	10.5	113	113	7.1

NOTES:

2 NEW ROWS FOR 69 & 100 (SEE NEXT PAGE)

1. Connector contacts and rear potting, without cables, without floating eyelets and without captive nut. Add 0.4g for connectors with floating mounts and 1g for connectors with captive nuts. See Figures 2.4 and 2.5 for the weight of cable.
2. Connector with contacts and rear potting.

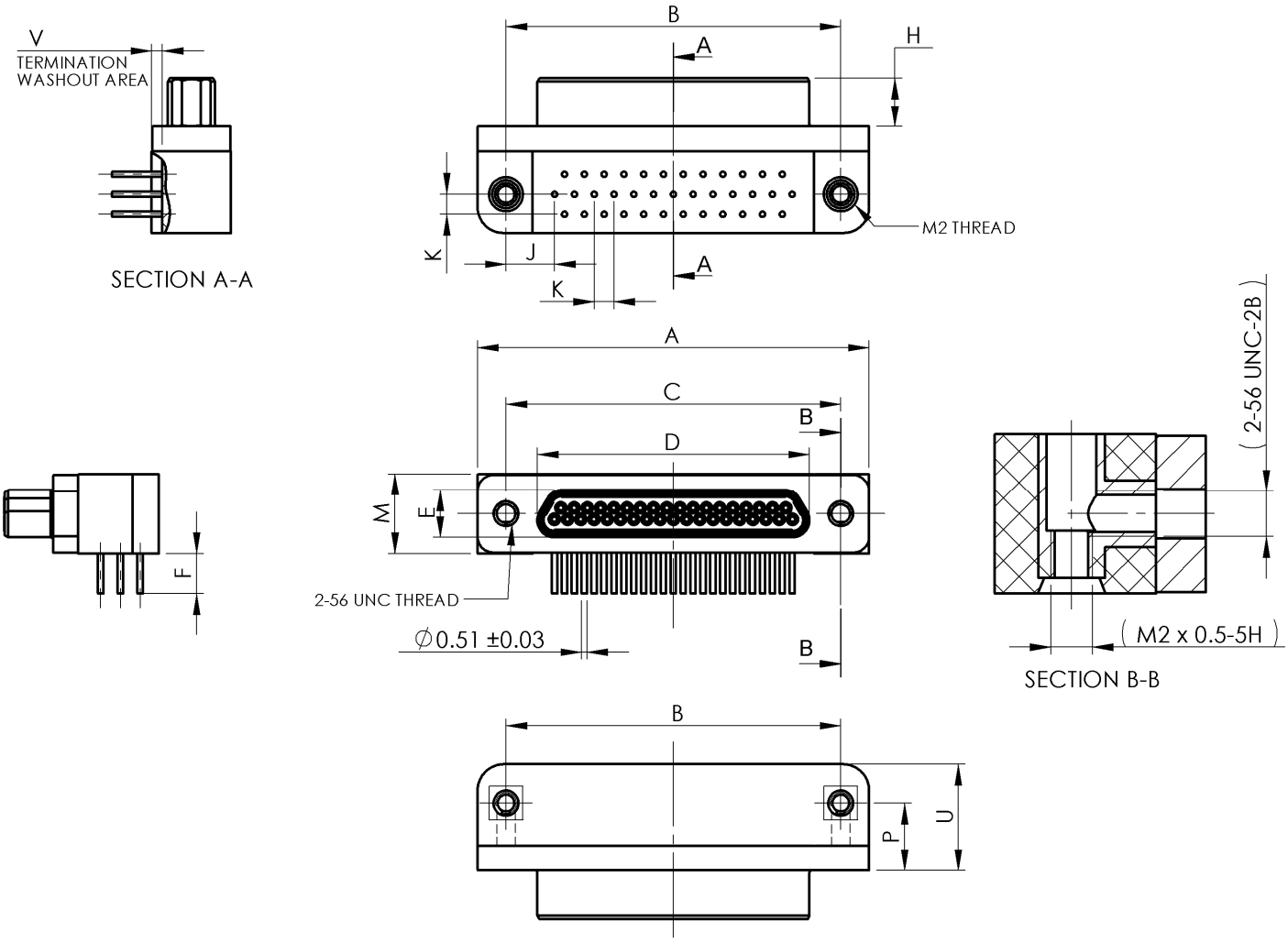
TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristic	Symbol	Maximum Rating	Unit	Remarks
1	Working Voltage Sea Level	U_R	150	Vrms	Note 1
2	Rated Current: (AWG26 and uninsulated solid wire)	I_R	2.5	A	
3	Rated Current: (AWG28)	I_R	1.5	A	
4	Operating Temperature Range	T_{op}	-55 to +125	°C	
5	Storage Temperature Range	T_{stg}	-55 to +125	°C	

Table 1(a) - RANGE OF COMPONENTS

Variants		Shell Size	Weight Max g						Mating Force N Max	Unmating Force	
Shell Finish				FR136 (2)	FR136A (2)	FR139 (2)	GMR7580	GMR7590		N Max	N Min
Nickel	Gold										
01	02						3.6	3.5			
01	02						4.3	4.3			
01	02						5.1	5.0			
01	02						5.4	5.6			
01	02						6.2	6.5			
01	02						7	7.3			
01	02						8.1	9.2			
01	02	69					14.2	17.0	153	153	9.6
01	02	100					20.9	25.5	222	222	13.9

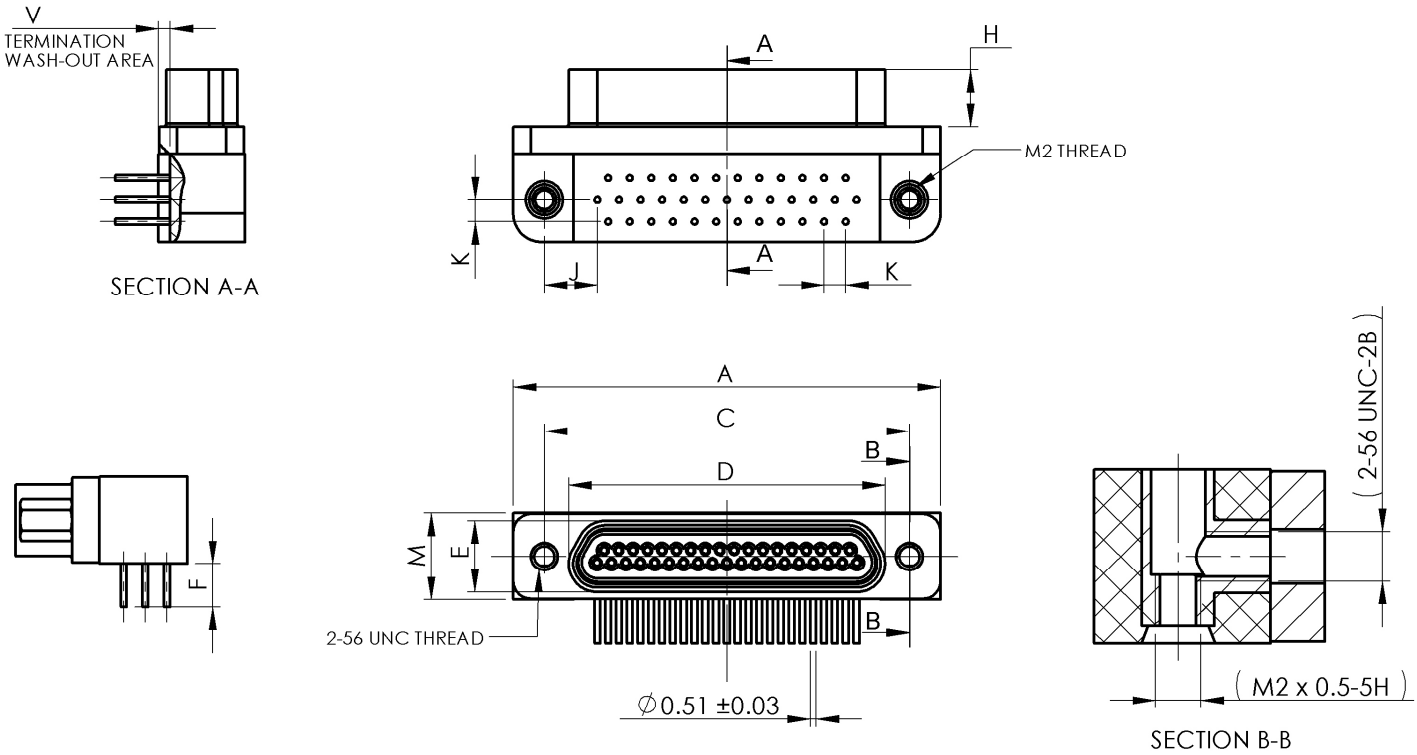
FIGURE 2.2K - CONNECTORS TYPE - GMR7590
PLUG-MALE CONTACTS



SHELL SIZE	A	B		C		D	E	F	
	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.
9	19.94	14.22	14.48	14.22	14.48	8.51	4.70	4.45	5.21
15	23.75	18.03	18.29	18.03	18.29	12.32	4.70	4.45	5.21
21	27.55	21.84	22.10	21.84	22.10	16.13	4.70	4.45	5.21
25	30.01	24.38	24.64	24.38	24.64	18.67	4.70	4.45	5.21
31	33.91	28.19	28.45	28.19	28.45	22.48	4.70	4.45	5.21
37	37.72	32.00	32.26	32.00	32.26	26.29	4.70	4.45	5.21

SHELL SIZE	H		J	K	M		P		U	V	
	MIN.	MAX.	TYP.	TYP.	MIN.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
9	4.57	4.73	3.38	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
15	4.57	4.73	4.32	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
21	4.57	4.73	4.32	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
25	4.57	4.73	4.65	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
31	4.57	4.73	4.65	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
37	4.57	4.73	4.65	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02

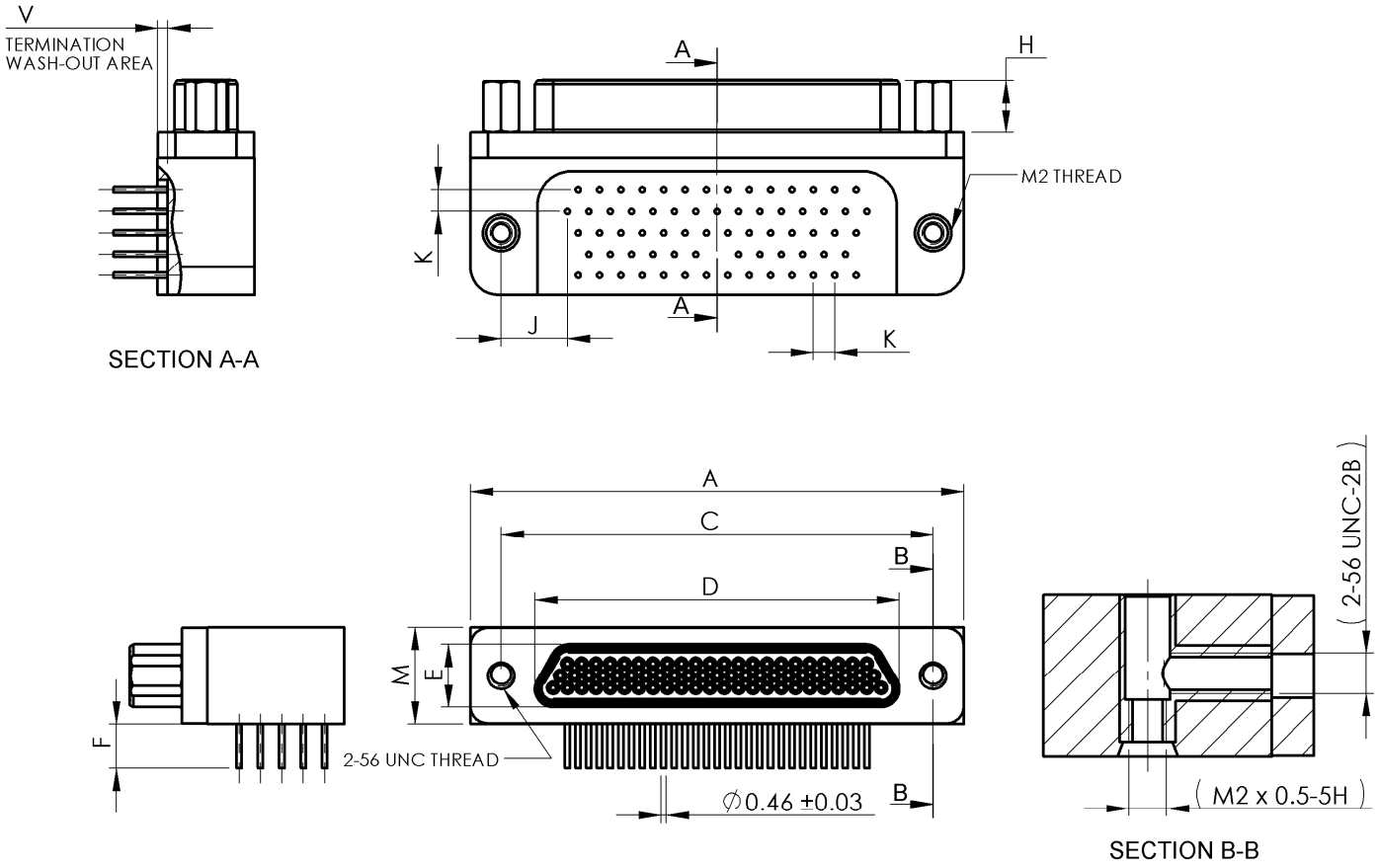
FIGURE 2.2L - CONNECTORS TYPE - GMR7590
RECEPTACLE FEMALE CONTACTS



SHELL SIZE	A	B		C		D	E	F	
	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.
9	19.94	14.22	14.48	14.22	14.48	10.16	6.38	4.45	5.21
15	23.75	18.03	18.29	18.03	18.29	13.97	6.38	4.45	5.21
21	27.56	21.83	22.10	21.83	22.10	17.78	6.38	4.45	5.21
25	30.01	24.38	24.64	24.38	24.64	20.32	6.38	4.45	5.21
31	33.91	28.19	28.45	28.19	28.45	24.13	6.38	4.45	5.21
37	37.72	32.00	32.26	32.00	32.26	27.94	6.38	4.45	5.21

SHELL SIZE	H		J	K	M		P		U	V	
	MIN.	MAX.	TYP.	TYP.	MIN.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
9	4.87	5.03	3.38	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
15	4.87	5.03	4.32	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
21	4.87	5.03	4.32	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
25	4.87	5.03	4.65	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
31	4.87	5.03	4.65	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02
37	4.87	5.03	4.65	1.91	7.61	7.87	6.10	6.60	10.16	0.89	1.02

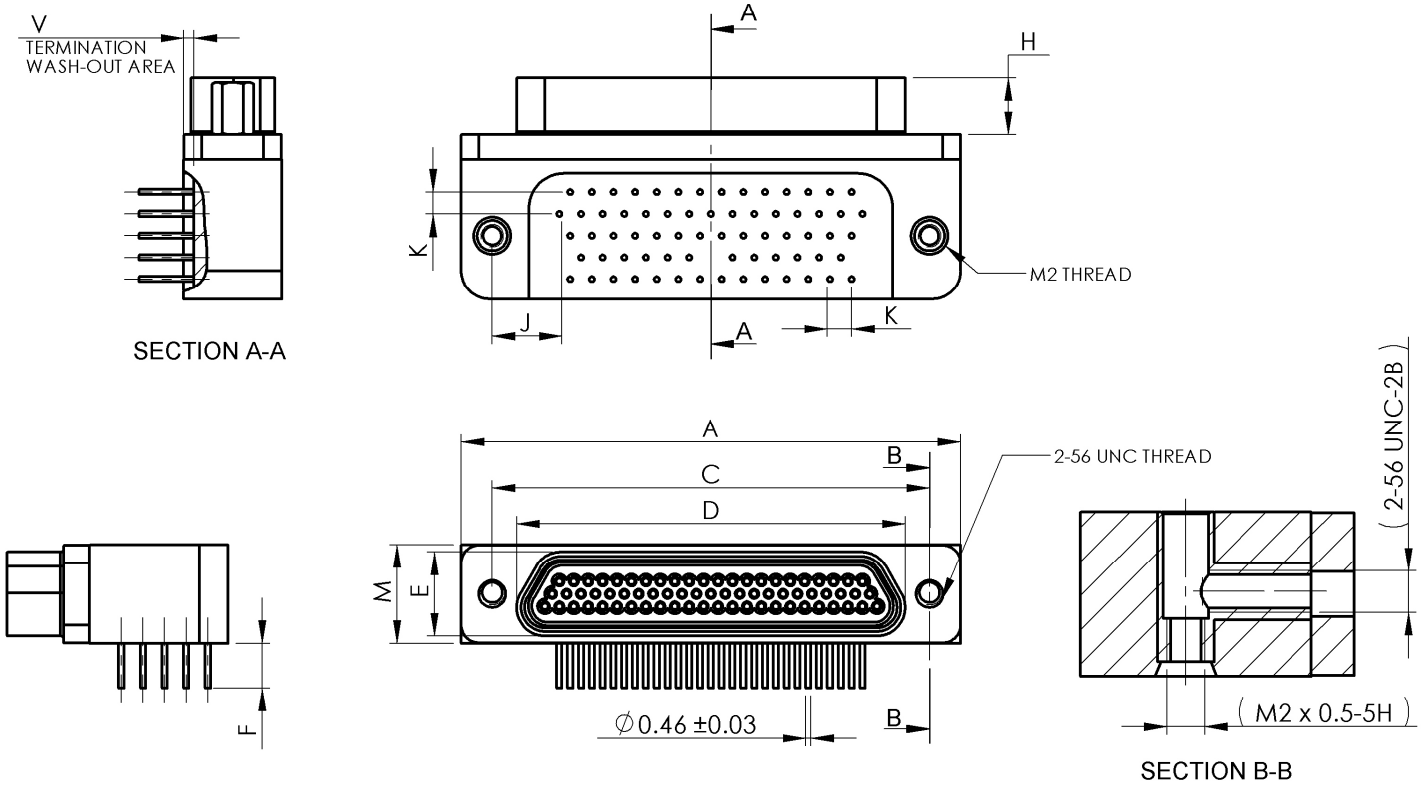
FIGURE 2.2M - CONNECTORS TYPE - GMR7590
PLUG-MALE CONTACTS



SHELL SIZE	A	B		C		D	E	F	
	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.
51	36.45	30.73	30.99	30.73	30.99	25.02	5.79	4.45	5.21
69	44.07	38.35	38.61	38.35	38.61	32.60	5.79	4.45	5.21

SHELL SIZE	H		J	K	M		P		U	V	
	MIN.	MAX.	TYP.	TYP.	MIN.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
51	4.57	4.73	3.05	1.91	8.66	8.92	7.37	7.87	12.45	0.89	1.02
69	4.57	4.73	5.91	1.91	8.66	8.92	8.64	9.14	14.50	0.89	1.02

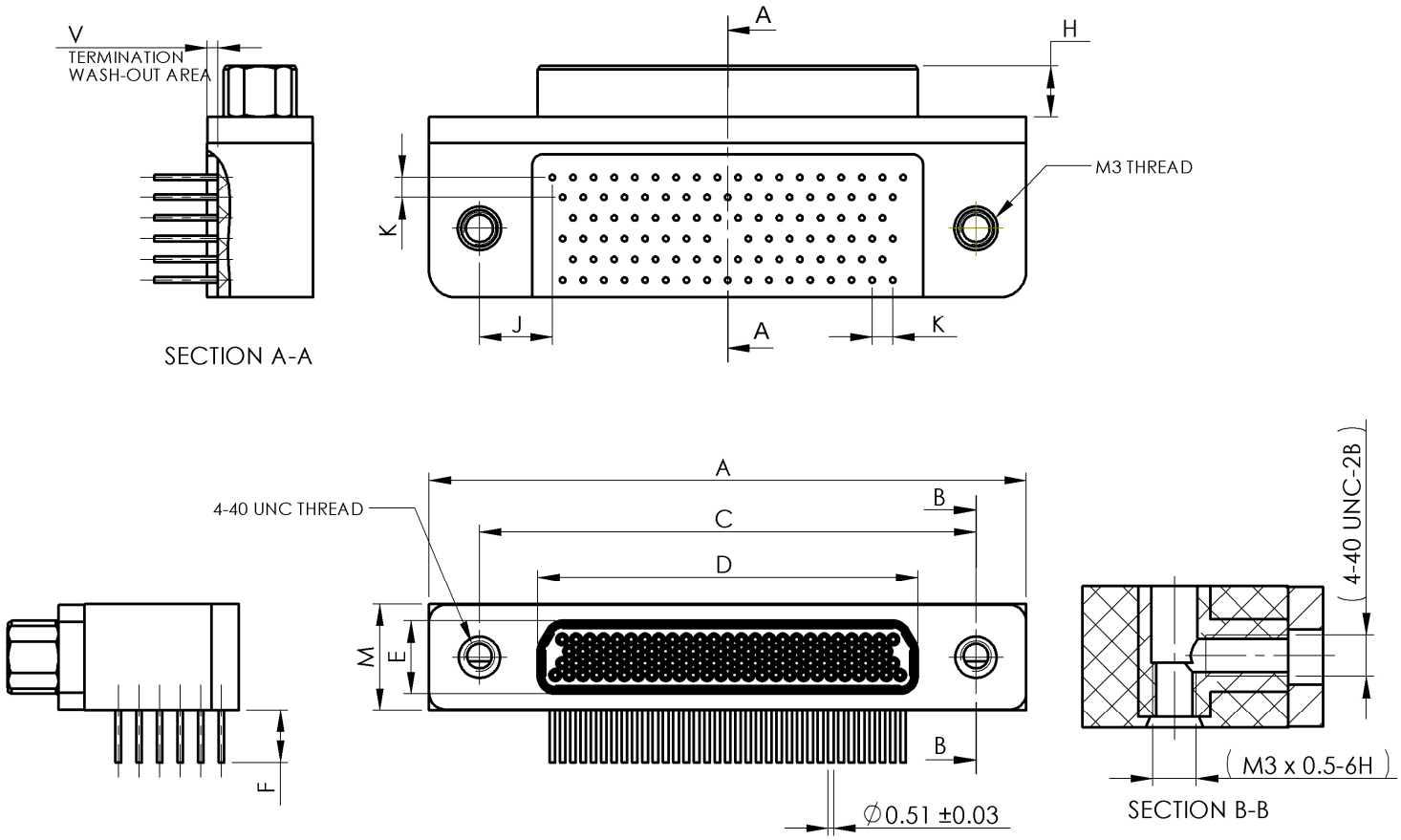
FIGURE 2.2N - CONNECTORS TYPE - GMR7590
RECEPTACLE FEMALE CONTACTS



SHELL SIZE	A	B		C		D	E	F	
	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.
51	36.45	30.73	30.99	30.73	30.99	26.67	7.52	4.45	5.21
69	44.07	38.35	38.61	38.35	38.61	34.24	7.52	4.45	5.21

SHELL SIZE	H		J	K	M		P		U	V	
	MIN.	MAX.	TYP.	TYP.	MIN.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
51	4.87	5.03	3.05	1.91	8.66	8.92	7.37	7.87	12.45	0.89	1.02
69	4.87	5.03	5.91	1.91	8.66	8.92	8.64	9.14	14.50	0.89	1.02

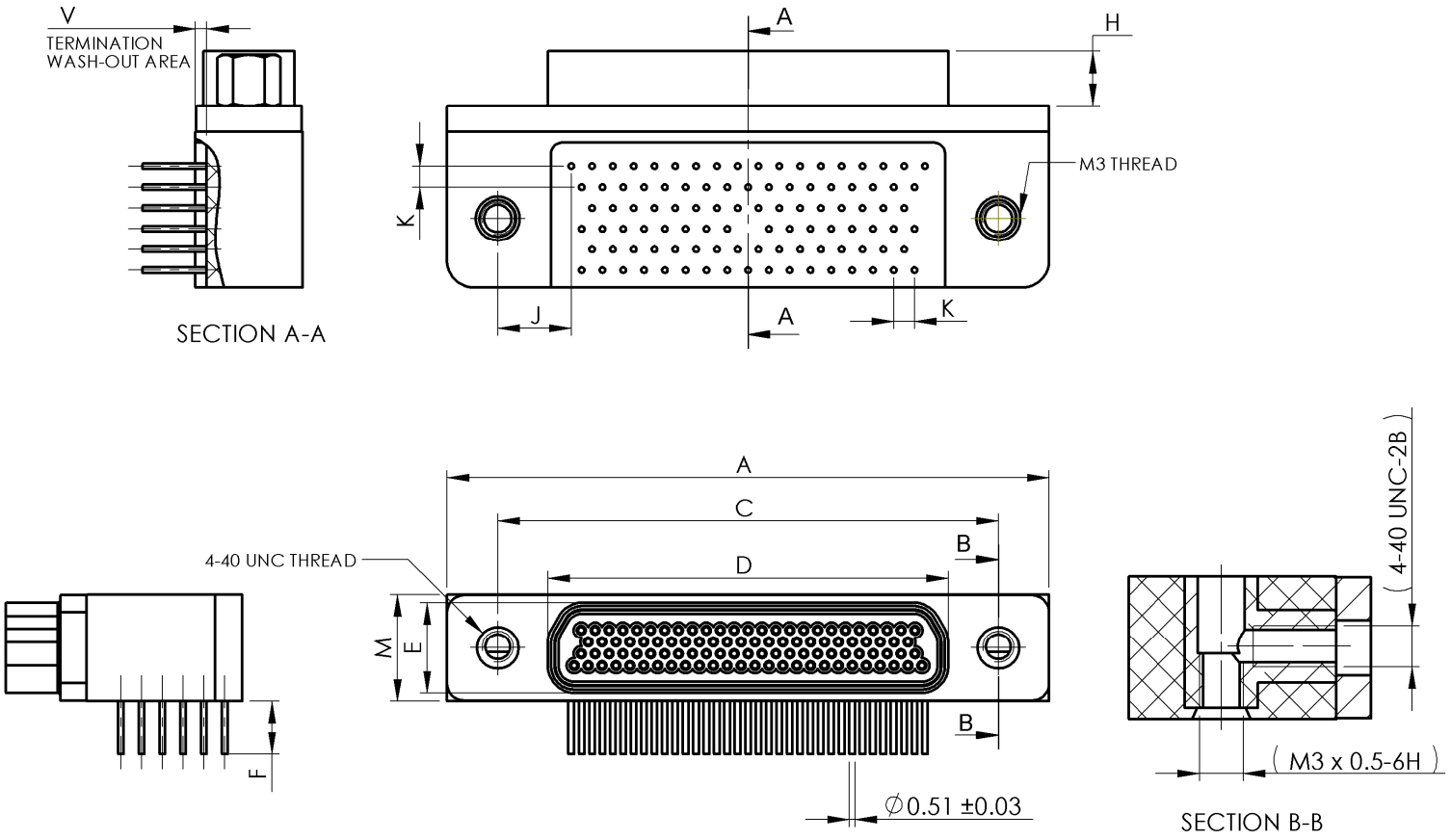
FIGURE 2.2P - CONNECTORS TYPE - GMR7590
PLUG-MALE CONTACTS



SHELL SIZE	A	B		C		D	E	F	
	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.
100	55.12	45.59	45.85	45.59	45.85	35.15	6.88	4.45	5.21

SHELL SIZE	H		J	K	M		P		U	V	
	MIN.	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
100	4.57	4.73	6.68	1.91	9.74	10.00	9.91	10.41	16.76	0.89	1.02

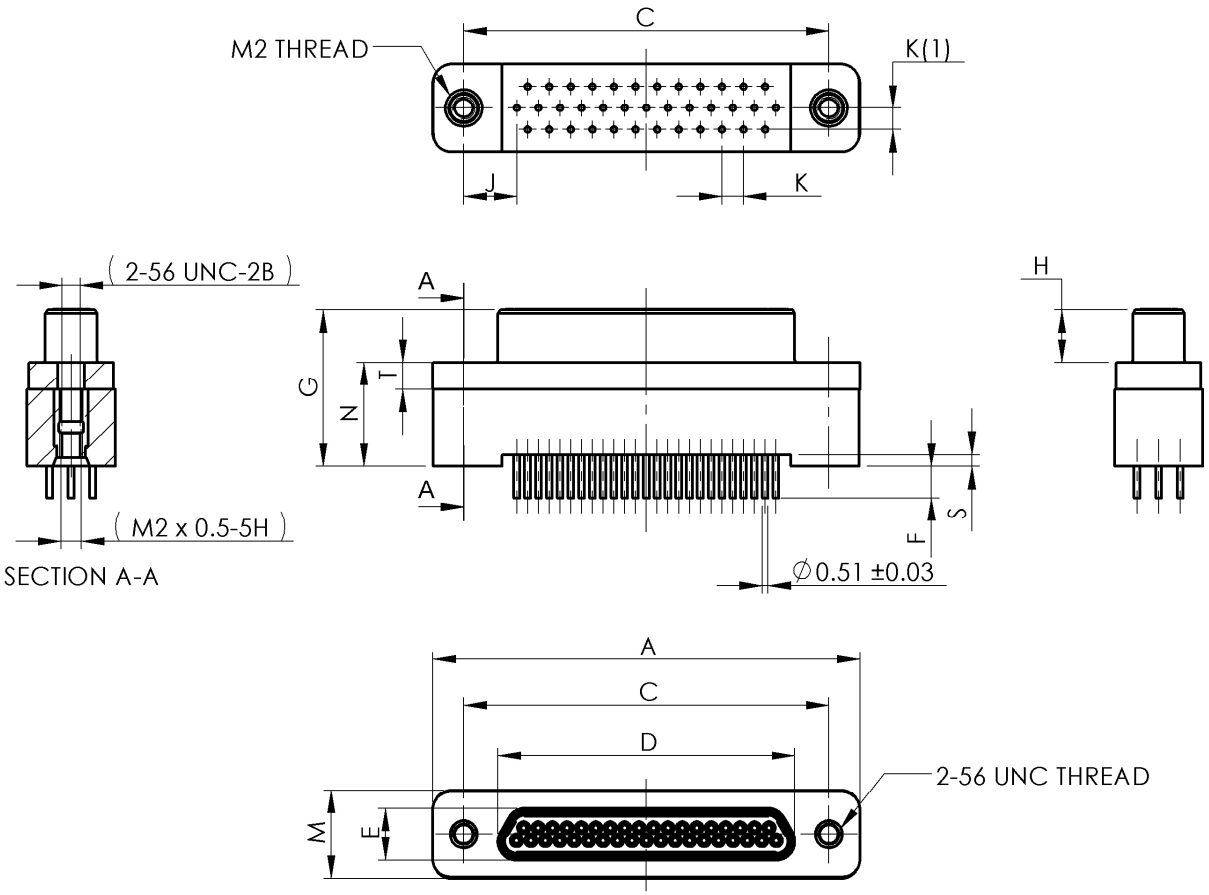
FIGURE 2.2Q - CONNECTORS TYPE - GMR7590
RECEPTACLE FEMALE CONTACTS



SHELL SIZE	A	B		C		D	E	F	
	MAX.	MIN.	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.
100	55.12	45.59	45.85	45.59	45.85	36.86	10.00	4.45	5.21

SHELL SIZE	H		J	K	M		P		U	V	
	MIN.	MAX.	TYP.	TYP.	MIN.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
100	4.87	5.03	6.68	1.91	9.74	10.00	9.91	10.41	16.76	0.89	1.02

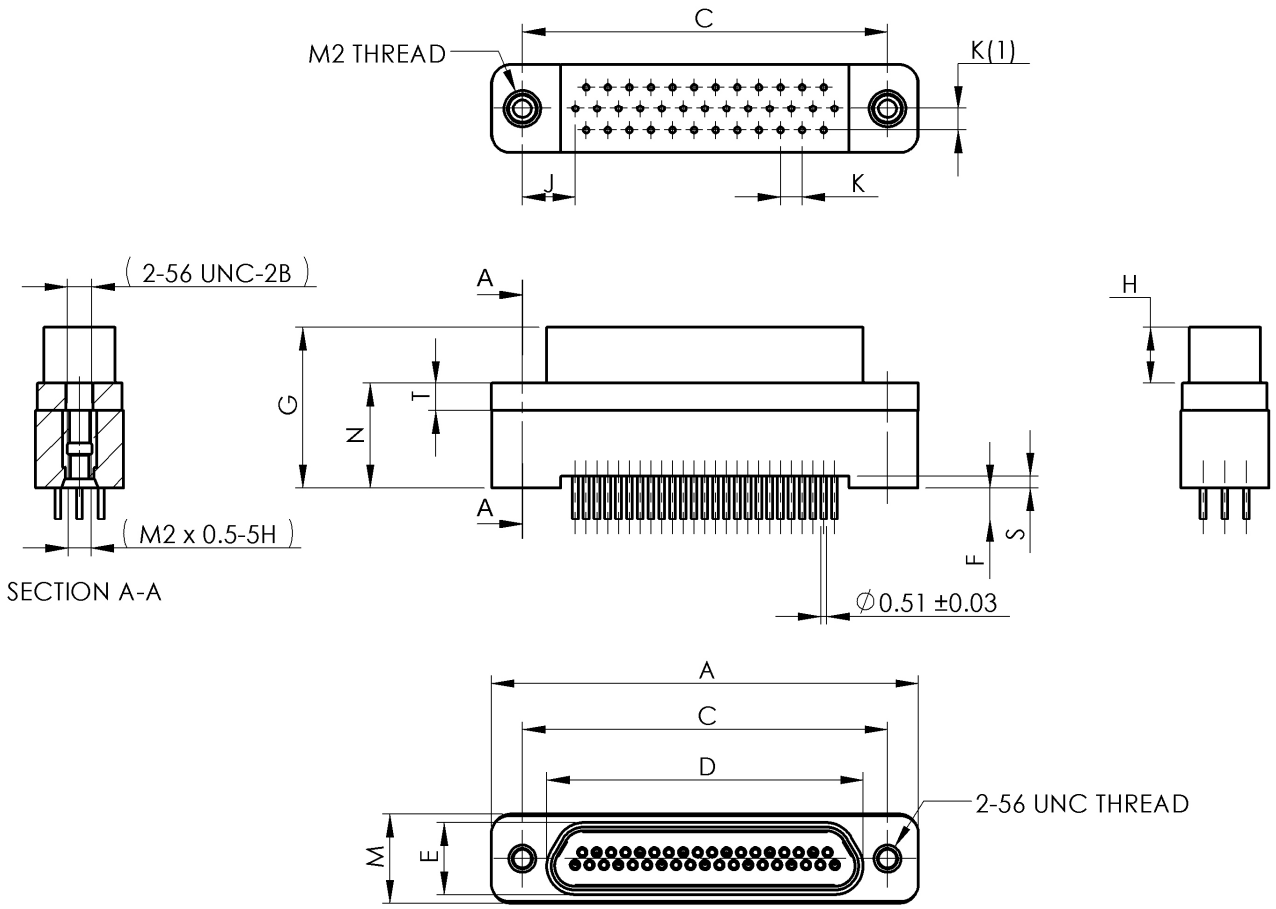
FIGURE 2.2R - CONNECTORS TYPE - GMR7580
PLUG-MALE CONTACTS



SHELL SIZE	A	C		D	E	F		G	H	
	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
9	19.94	14.22	14.48	8.51	4.70	4.45	5.21	13.97	4.57	4.73
15	23.75	18.03	18.29	12.32	4.70	4.45	5.21	13.97	4.57	4.73
21	27.56	21.84	22.10	16.13	4.70	4.45	5.21	13.97	4.57	4.73
25	30.01	24.38	24.64	18.67	4.70	4.45	5.21	13.97	4.57	4.73
31	33.91	28.19	28.45	22.48	4.70	4.45	5.21	13.97	4.57	4.73
37	37.72	32.00	32.26	26.29	4.70	4.45	5.21	13.97	4.57	4.73

SHELL SIZE	J	K	K(1)	M		N		S		T	
	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
9	3.38	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
15	4.32	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
21	4.32	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
25	4.65	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
31	4.65	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
37	4.65	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44

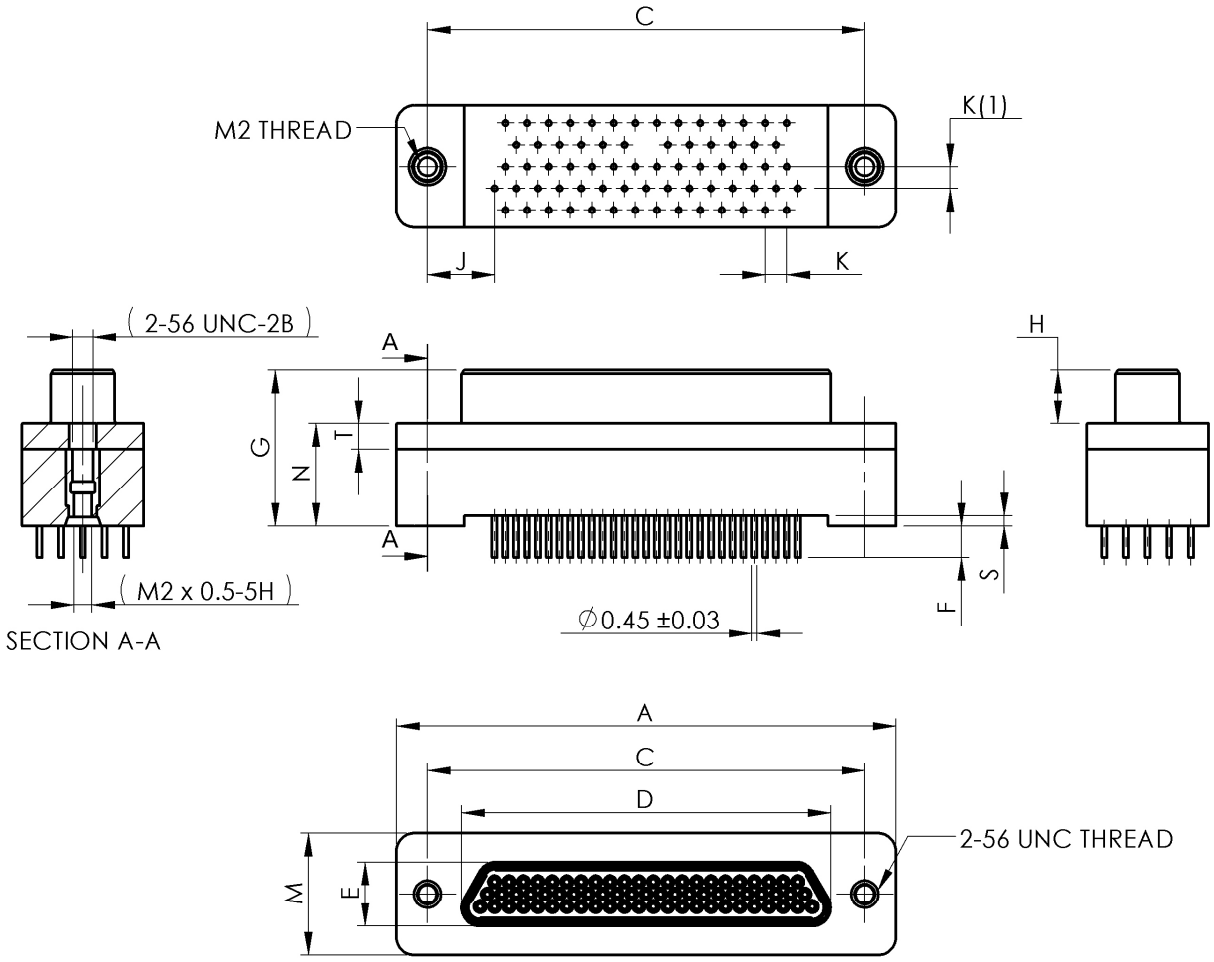
FIGURE 2.2S - CONNECTORS TYPE - GMR7580
RECEPTACLE FEMALE CONTACTS



SHELL SIZE	A	C		D	E	F		G	H	
	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
9	19.94	14.22	14.48	10.16	6.38	4.45	5.21	14.10	4.87	5.03
15	23.75	18.03	18.29	13.97	6.38	4.45	5.21	14.10	4.87	5.03
21	27.56	21.84	22.10	17.78	6.38	4.45	5.21	14.10	4.87	5.03
25	30.01	24.38	24.64	20.32	6.38	4.45	5.21	14.10	4.87	5.03
31	33.91	28.19	28.45	24.13	6.38	4.45	5.21	14.10	4.87	5.03
37	37.72	32.00	32.26	27.94	6.38	4.45	5.21	14.10	4.87	5.03

SHELL SIZE	J	K	K(1)	M		N		S		T	
	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
9	3.38	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
15	4.32	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
21	4.35	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
25	4.65	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
31	4.65	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44
37	4.65	1.91	1.91	7.61	7.87	8.76	9.02	0.89	1.02	2.34	2.44

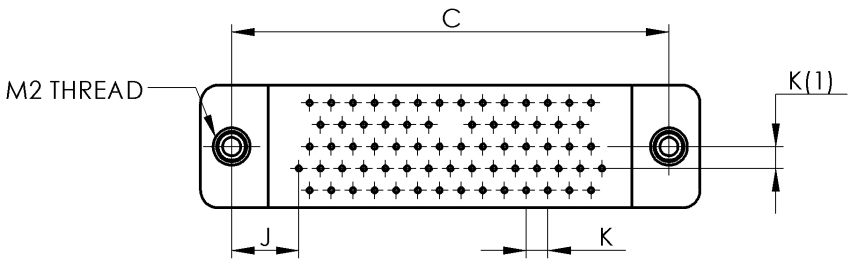
FIGURE 2.2T - CONNECTORS TYPE - GMR7580
PLUG-MALE CONTACTS

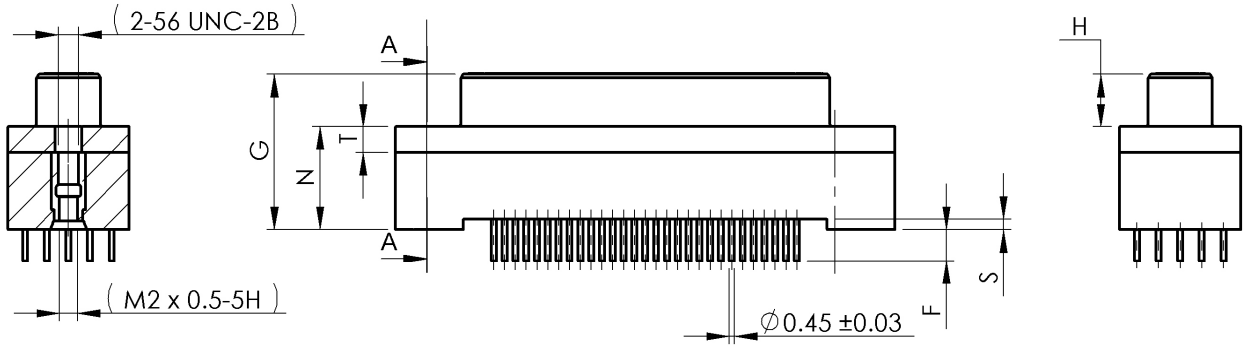


SHELL SIZE	A	C		D	E	F		G	H	
	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
51	36.45	30.73	30.99	25.02	5.79	4.45	5.21	13.97	4.57	4.73
69	44.07	38.35	38.61	32.55	5.79	4.45	5.21	13.97	4.57	4.73

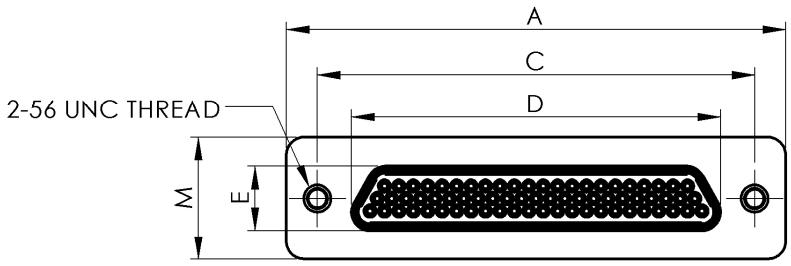
SHELL SIZE	J	K	K(1)	M		N		S		T	
	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
51	3.05	1.91	1.91	8.66	8.92	8.76	9.02	0.77	0.90	2.34	2.44
69	5.91	1.91	1.91	10.57	10.83	8.76	9.02	0.77	0.90	2.34	2.44

FIGURE 2.2U - CONNECTORS TYPE - GMR7580
RECEPTACLE FEMALE CONTACTS





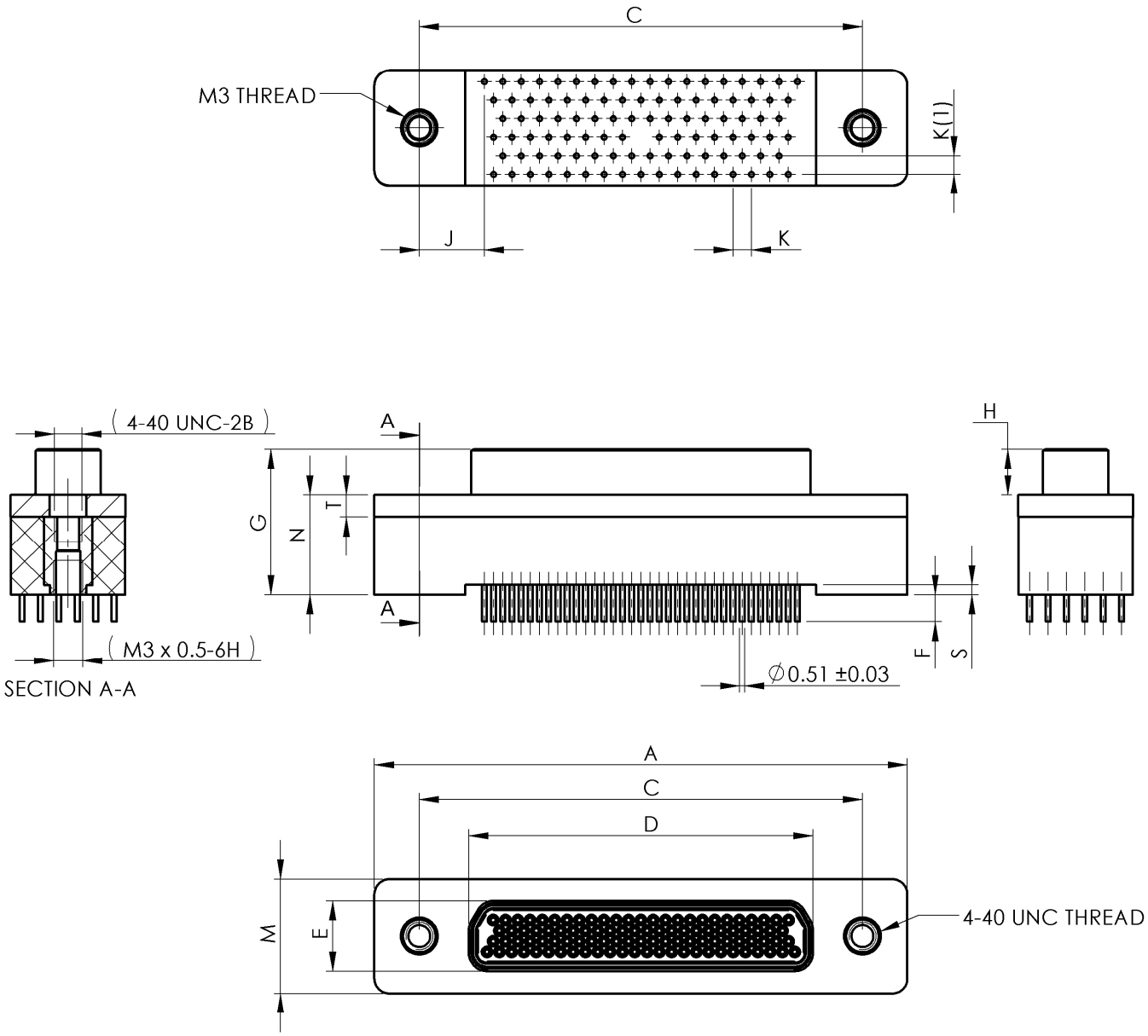
SECTION A-A



SHELL SIZE	A	C		D	E	F		G	H	
	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
51	36.45	30.73	30.99	26.67	7.52	4.45	5.21	13.97	4.87	5.03
69	44.07	38.35	38.61	34.34	7.52	4.45	5.21	13.97	4.87	5.03

SHELL SIZE	J	K	K(1)	M		N		S		T	
	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
51	3.05	1.91	1.91	8.66	8.92	8.76	9.02	0.77	0.90	2.34	2.44
69	5.91	1.91	1.91	10.54	10.80	8.76	9.02	0.77	0.90	2.34	2.44

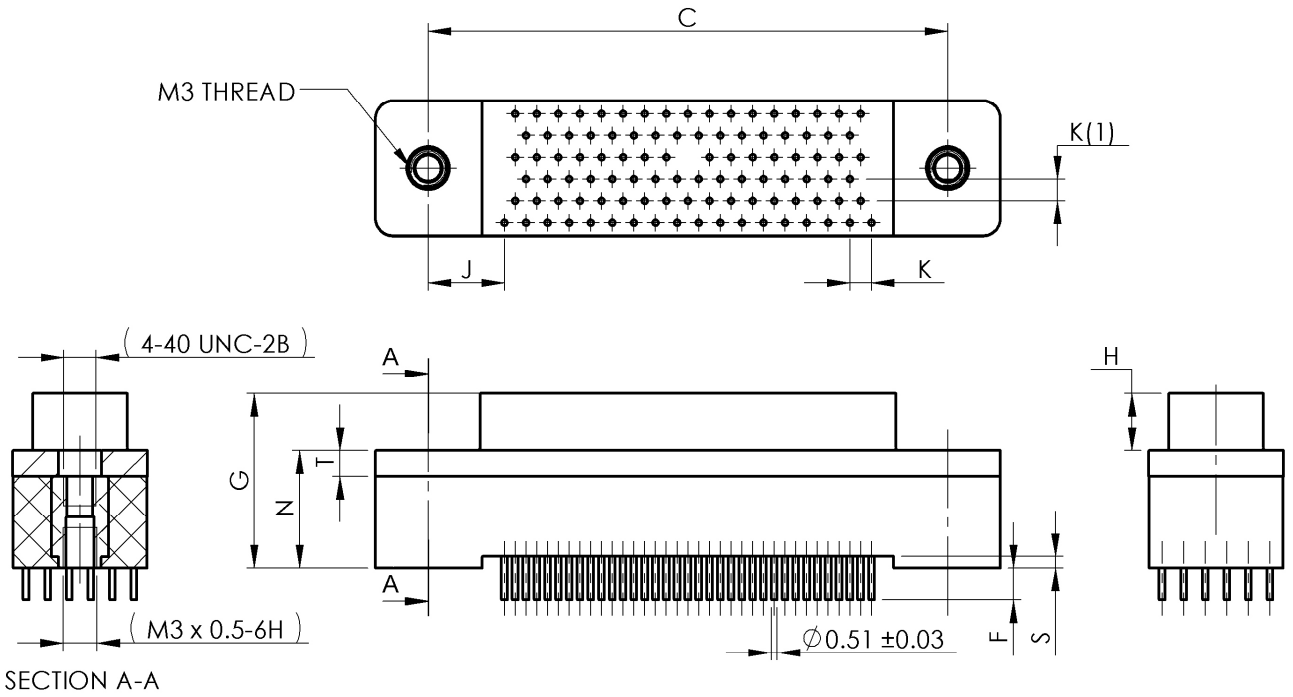
FIGURE 2.2V - CONNECTORS TYPE - GMR7580
PLUG-MALE CONTACTS

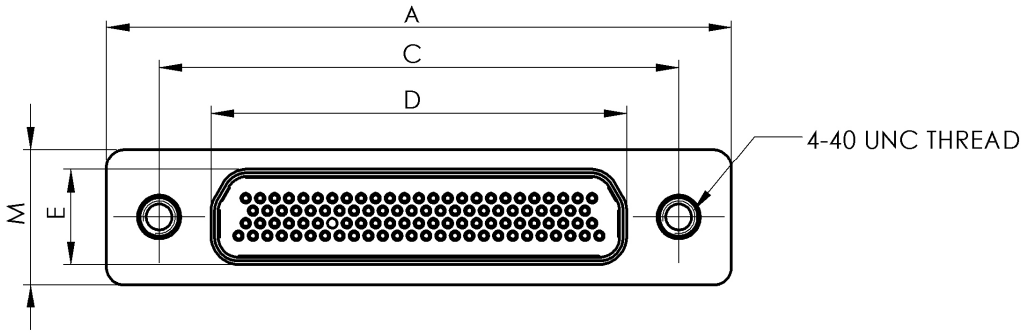


SHELL SIZE	A	C		D	E	F		G	H	
	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
100	52.12	45.59	45.85	35.15	6.88	4.45	5.21	15.44	4.58	4.73

SHELL SIZE	J	K	K(1)	M		N		S		T	
	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
100	6.68	1.91	1.91	11.73	11.99	10.66	10.92	0.89	1.02	2.13	2.39

FIGURE 2.2W - CONNECTORS TYPE - GMR7580
RECEPTACLE FEMALE CONTACTS

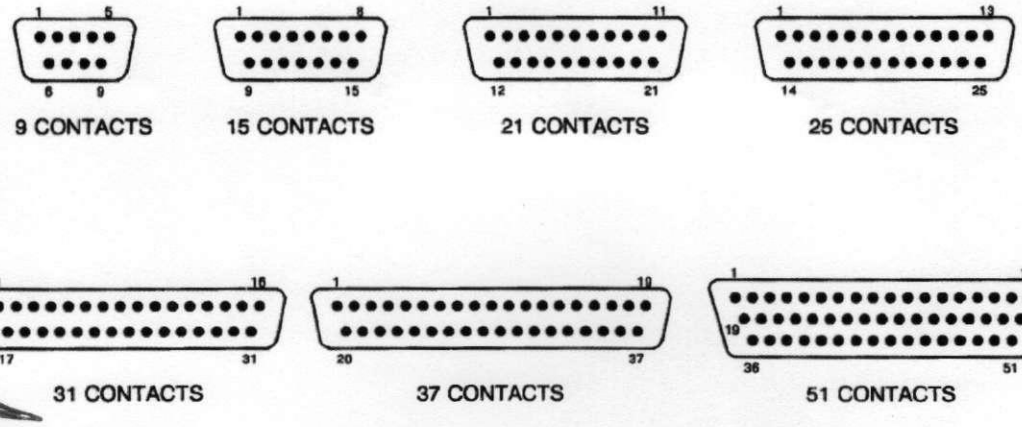




SHELL SIZE	A	C		D	E	F		G	H	
	MAX.	MIN.	MAX.	MAX.	MAX.	MIN.	MAX.	MAX.	MIN.	MAX.
100	55.12	45.59	45.85	36.86	8.45	4.45	5.21	15.31	4.87	5.03

SHELL SIZE	J	K	K(1)	M		N		S		T	
	MAX.	TYP.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
100	6.68	1.91	1.91	11.73	11.99	10.79	11.05	0.89	1.02	2.13	2.39

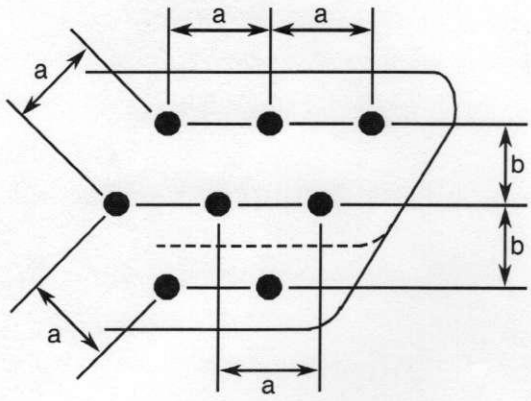
FIGURE 3 - CONTACT ARRANGEMENTS
FRONT VIEW OF MALE INSERT - USE MIRROR VIEW FOR FEMALE INSERT



Two new pictures for 69 & 100 (SEE NEXT PAGE)

NOTES:
1. Only the outside contact cavities on each row are identified in the drawing, the remainder follow sequentially. Contact numbers are shown outside the insert for readability.

Contact Centres



NOTES:
1. a = Distance between contact centres: 1.27mm (typical)
2. b = Distance between rows: 1.09mm (typical).

4. REQUIREMENTS

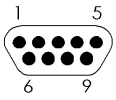
4.1 GENERAL

The complete requirements for procurement of the connectors specified herein are stated in this specification and ESCC Generic Specification No. 3401. Deviations from the Generic Specification, applicable to this specification only, are listed in Para. 4.2.

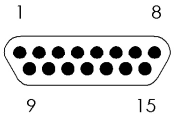
Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirements and do not affect the components' reliability, are listed in the appendices attached to this

CONTACT ARRANGEMENTS

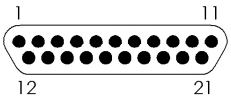
FRONT VIEW OF MALE INSERT - USE MIRROR VIEW FOR FEMALE INSERT



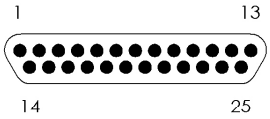
9 CONTACTS



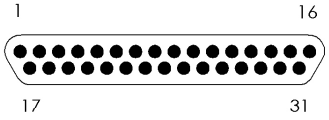
15 CONTACTS



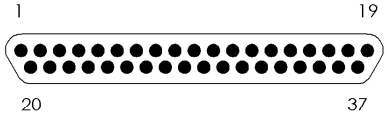
21 CONTACTS



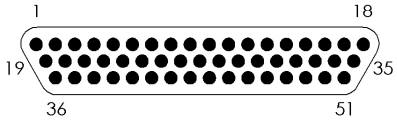
25 CONTACTS



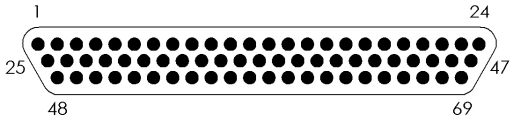
31 CONTACTS



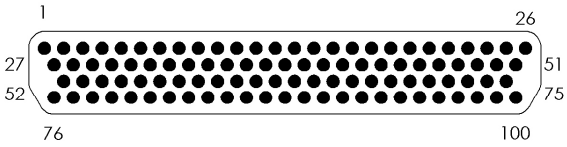
37 CONTACTS



51 CONTACTS



69 CONTACTS



100 CONTACTS

4.3.11 Probe Damage
Not applicable.

4.3.12 Solderability
Not applicable.

4.4 MATERIALS AND FINISHES
The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the components specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Shells
Shells shall be made of aluminium alloy. The plating shall be 25.4µm minimum of electroless nickel (Variant 01) or with a minimum thickness of 2.54µm of gold over a layer of electroless nickel underlay (Variant 02).

4.4.2 Inserts
Inserts shall be made of glass fibre-filled diallylphthalate resin or suitable thermoplastic material.

4.4.3 Contacts

OR TYPE N WITH TYPE 2 FINISH AND UNDERPLATING TO 3.3.1(b) IN ACCORDANCE WITH ESCC 23500.

4.4.3.1 Female Contacts

The contact body shall be made of copper alloy with an underplate of 1µm minimum of copper to MIL-C-14550, gold plated with 1.27µm minimum of gold, Type 2, Grade C of MIL-DTL-45204. Measurement of thickness shall be performed at a distance of 1.5mm from the engagement end.

4.4.3.2 Male Contacts

The contact body and the bundle shall be made of copper alloy with an underplate of 1µm minimum of copper to MIL-C-14550, gold plated with 1.27µm minimum of gold, Type 2, Grade C of MIL-DTL-45204. Measurement of thickness shall be performed at a distance of 1.5mm from the engagement end.

OR TYPE M WITH TYPE 2 FINISH AND UNDERPLATING TO 3.3.1(b) IN ACCORDANCE WITH ESCC 23500.

4.4.4 Interfacial Seals
Interfacial seals shall be made of silicon base rubber.

4.4.5 Insulated Wires
Wire materials and finishes shall be in accordance with the requirements specified in Para. 4.4 of ESCC Detail Specifications No. 3901/002 and 3901/013.

4.4.6 Uninsulated Solid Wire
Uninsulated solid wires shall be made of copper alloy in accordance with Type S as specified in QQ-W-343. They shall be gold-plated in accordance with Class ØØ, Grade C or D, as specified in MIL-DTL-45204.

OR TYPE A WITH TYPE 14 FINISH IN ACCORDANCE WITH ESCC 23500.

4.4.7 Rear Potting
Rear potting shall be made of epoxy resin. For connectors Type FR136, Type FR136A and Type FR139, the rear container shall be made from glass-fibre filled diallylphthalate resin.

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and the following paragraphs.

Each component shall be marked in respect of:

(a) The ESCC Component Number.
(b) Characteristics.
(c) Traceability Information.

4.5.2 The ESCC Component Number

Each component shall bear the ESCC Component Number which shall be constituted and marked as follows:

340102901B

- Detail Specification Number: 3401029
- Type Variant (See Table 1(a)): 01
- Testing Level: B

N.B.

Marking of the Type Variant is mandatory. No further reference to type variant is made in this specification.

4.5.3 Characteristics

The characteristics to be marked in the following order of precedence are:

(a) Shell Size.
(b) Contact Type.
(c) Termination Type.
(d) Mounting.

The information shall be constituted and marked as follows (example): 51PFR112F

- Shell size: 51
- Contact type: P
- Termination Type: FR112
- Mounting: F

4.5.3.1 Shell Size

Shell size shall be designated by the number of contacts.

Specified numbers are: 9, 15, 21, 25, 31, 37, ~~and~~ 51, 69 AND 100.

4.5.3.2 Contact Type

Contact types shall be indicated by the following code letters.

Code Letter	Contact Type
P	Male
S	Female

4.5.3.3 Termination Type

Codes defining the termination type and details according to Figures 2.1, 2.2, 2.4 and 2.5 as follows:-.

Code	Type	Min. Length (mm)
FR112	AWG26 Wire 390101302B	508
FR112A	AWG26 Wire 390100256B	508
FR113	AWG26 Wire 390101302B	914
FR113A	AWG26 Wire 390100256B	914
FR123	AWG26 Wire 390101302B	4000
FR123A	AWG26 Wire 390100256B	4000
FR114	AWG28 Wire 390101301B	508
FR114A	AWG28 Wire 390100261B	508
FR115	AWG28 Wire 390101301B	914
FR115A	AWG28 Wire 390100261B	914
FR116	Uninsulated Wire	25.4
FR136 FR136A	90° Mounting on PCB	-
FR139	Straight Mounting on PCB	-

2 NEW ROWS (SEE NEXT PAGE)

2.54mm PCB TERMINATION PITCH

4.5.3.4 Mounting

The letter E indicates a captive nut.

The letter F shall indicate a floating mount.

If the shell has fixed mounting holes, these letters shall be omitted.

4.5.4 Traceability Information

Traceability information shall be marked in accordance with the requirements of ESCC Basic Specification No. 21700.

GMR7590	Uninsulated wire formed for 90° Mounting on PCB, 1.91mm PCB termination pitch.	-
GMR7580	Uninsulated wire formed for Straight Mounting on PCB, 1.91mm PCB termination pitch.	-