ISOLATORS, WAVEGUIDE

2.5 - 40 GHz

BASED ON SERIES **HD****

ESCC Detail Specification No. 3202/020

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DCR No.	CHANGE DESCRIPTION
799	Specification upissued to incorporate editorial changes per DCR.

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1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for an Isolator, Waveguide, 2.5 - 40 GHz, based on Series **HD****. It shall be read in conjunction with ESCC Generic Specification No. 3202, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

A list of the type variants of the isolators specified herein, which are also covered by this specification, is given in "Table 1(a) - Type Variant Summary".

For each type variant, the full electrical and physical characteristics are given in individual Tables 1(a), "Type Variant Detailed Information", at the end of this specification.

The contents of the individual Tables 1(a) shall be as shown in Table 1(c) and the characteristics therein listed shall relate to the design parameters of the individual isolators, optimised for the intended application.

The specific characteristics shall be negotiated between the Manufacturer and the Orderer. The Manufacturer shall then apply to the ESCC Secretariat for a type variant number for each individual isolator concerned, by sending a finalised Table 1(a) to the ESCC Secretariat.

1.3 MAXIMUM RATINGS

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

1.4 PHYSICAL DIMENSIONS

The physical dimensions of the isolators specified herein, are shown in Figure 2.

1.5 FUNCTIONAL DIAGRAM

The functional diagram, showing port identification of the isolators specified herein, is 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. 3202, Ferrite Microwave Components, Isolators and Circulators.
(b) IEC Publication No. 154, Flanges for Waveguides.
(c) MIL-F-3922, Flange, Waveguide, General Purpose, General 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.

TABLE 1(a) - TYPE VARIANT SUMMARY

Variant	Based On Type	Centre Freq. (f_C) (GHz)	Min. Bandwidth (B) (GHz)	Minimum Isolation (ISO) (dB)	Maximum Insertion Loss (IL) (dB)	Minimum Return Loss	
						Input (RL_{IN}) (dB)	Output (RL_{OUT}) (dB)
01	15HD338	7.5	0.5	20.0	0.5	19.1	19.1
02	15HD339	7.5	0.5	20.0	0.35	20.8	20.8
03	20HD316	18.1	0.8	20.0	0.5	19.1	19.1

NOTES

1. Full electrical and physical characteristics are given in the individual Tables 1(a) at the end of this specification.

TABLE 1(b) - MAXIMUM RATINGS

No.	Characteristics	Symbol	Maximum Ratings	Unit
1	Frequency Range	-	2.5 to 40	GHz
2	Peak RF Frequency Power Product Peak RF Power Duration Peak RF Power Duty Cycle	P_P - -	200 50 10	GHzW µs %
3	Rated RF Power (Continuous Reflected)		10	GHzW
4	Load RF Frequency Power Product (Reflected) Load RF Power (Reflected) Duration Load RF Power (Reflected) Duty Cycle	P_{Pr} - -	100 50 10	GHzW µs %
5	Minimum RF Leakage	E	-70	dBc
6	Operating Temperature Range	T_{op}	Item 8 (1)	ºC
7	Storage Temperature Range	T_{stg}	-60 to +125	ºC

NOTES

1. See Individual Tables 1(a).

FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

TABLE 1(c) - FORMAT FOR INDIVIDUAL TABLES 1(a)

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

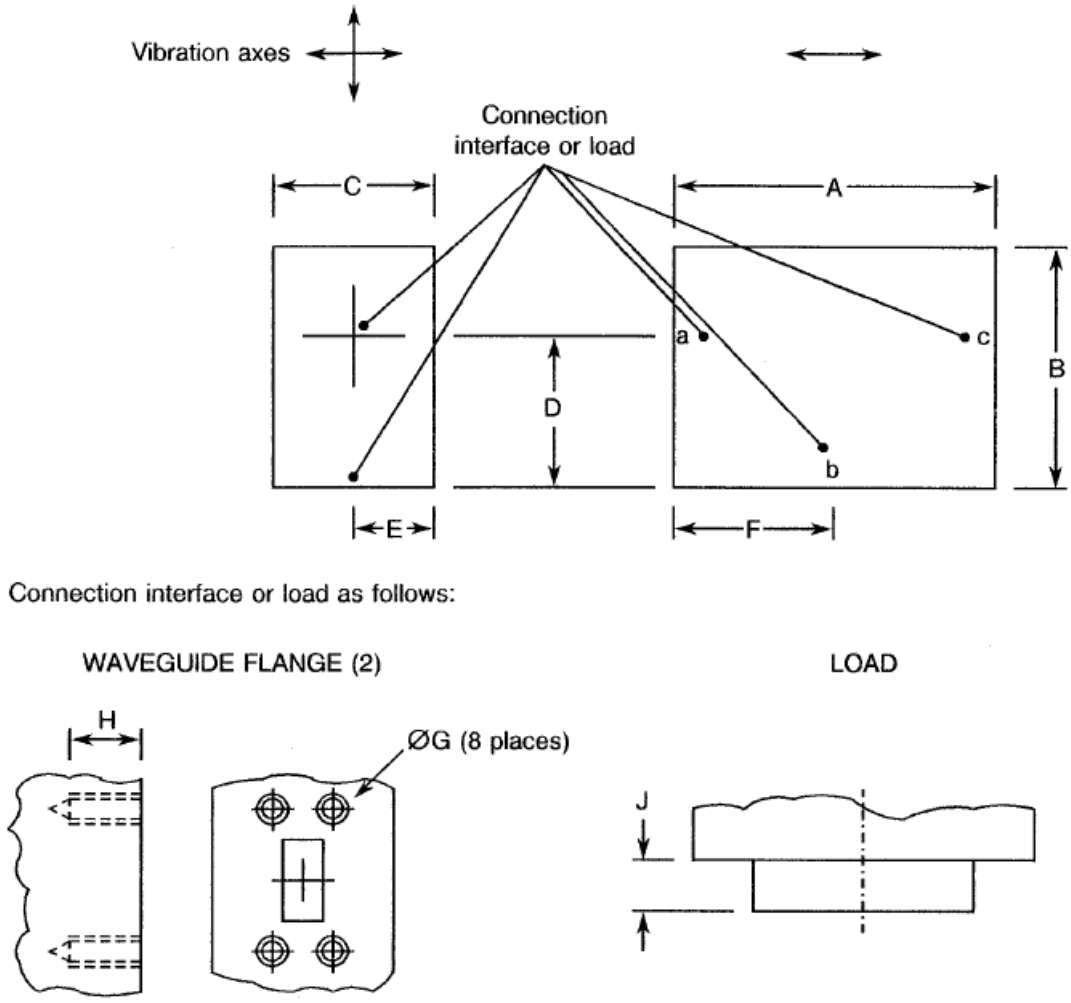
TYPE VARIANT No.

No.	Characteristics	Symbol	Values		Unit	Remarks
			Min.	Max.		
1	Centre Frequency	f_C			GHz	
2	Bandwidth	B		-	GHz	
3	Isolation (Output to Input)	ISO		-	dB	Note 1
4	Insertion Loss (Input to Output)	IL	-		dB	Note 1
5	Return Loss Input Output	RL_{IN} RL_{OUT}		- -	dB dB	Note 1
6	Weight	-	-		g	
7	Interfaces Input Output	- -	154 IEC- 154 IEC-		- -	Note 2
8	Operating Temperature Range	T_{op}			ºC	T_{amb} (Note 3)
9	Physical Dimensions	A	-		mm	
		B	-		mm	
		C	-		mm	
		D			mm	
		E			mm	
		F			mm	
		G			mm	
		H		-	mm	
		J	-		mm	
10	Configuration and Functional Diagram	-	Figure 3( )		-	

NOTES

1. Over the frequency range specified in Items 1 and 2. Bandwidth is symmetrical around the centre frequency.
2. For components with flanges to MIL-F-3922, the applicable reference shall be inserted here. The interface description refers to the flange that the component is intended to mate with.
3. The Operating Temperature Range shall not exceed the Storage Temperature Range.

FIGURE 2 - PHYSICAL DIMENSIONS



NOTES

1. Ports shall be marked as specified in Figure 3.
2. The perpendicularity or parallelism between the waveguide flanges shall be 0.2mm maximum.
3. For dimensions, see Individual Tables 1(a).

FIGURE 3 - FUNCTIONAL DIAGRAM

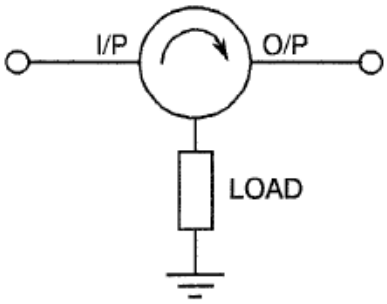


Figure	Port		
	a	b	c
3(a)	I/P	O/P	LOAD
3(b)	O/P	I/P	LOAD
3(c)	LOAD	O/P	I/P
3(d)	LOAD	I/P	O/P
3(e)	O/P	LOAD	I/P
3(f)	I/P	LOAD	O/P

4 REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the isolators specified herein shall be as stated in this specification and ESCC Generic Specification No. 3202. Deviations from the Generic Specification, applicable to this specification only, are detailed 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 specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

None.

4.2.2 Deviations from Final Production Tests (Chart II)

(a) Para. 9.7.1.6, Voltage Proof: Shall not be performed.
(b) Para. 9.6, Seal Test: Shall not be performed.
(c) Para. 9.8, Coupling Proof Torque: Shall not be performed.
(d) Para. 9.9, Mating and Unmating Forces: Shall not be performed.
(e) Para. 9.10, Centre Contact Retention: Shall not be performed..
(f) Para. 9.13, Contact Engagement and Separation Forces: Shall not be performed.

4.2.3 Deviations from Burn-in and Electrical Measurements (Chart III)
Not applicable.

4.2.4 Deviations from Qualification Tests (Chart IV)
(a) Para. 9.8, Coupling Proof Torque: Shall not be performed.
(b) Para. 9.20, Endurance: Shall not be performed.
(c) Para. 9.21, Solderability: Shall not be performed.
(d) Para. 9.22, Robustness of Terminations: Shall not be performed.
(e) Para. 9.6, Seal Test: Shall not be performed.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)
(a) Para. 9.8, Coupling Proof Torque: Shall not be performed.
(b) Para. 9.20, Endurance: Shall not be performed.
(c) Para. 9.6, Seal Test: Shall not be performed.
(d) Para. 9.9, Mating and Unmating Forces: Shall not be performed.
(e) Para. 9.13, Contact Engagement and Separation Forces: Shall not be performed.
(f) Para. 9.21, Solderability: Shall not be performed.
(g) Para. 9.22, Robustness of Terminations: Shall not be performed.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Contact Engagement and Separation Forces
Not applicable.

4.3.2 Voltage Proof
Not applicable.

4.3.3 Weight
The maximum weight of the components specified herein shall be as defined in the Individual Tables 1(a).

4.3.4 Coupling Proof Torque
Not applicable.

4.3.5 Mating and Unmating Forces
Not applicable.

4.3.6 Centre Contact Retention
Not applicable.

4.3.7 Dimension Check
The dimensions of the components specified herein shall be verified in accordance with the requirements set out in Para. 9 of ESCC Generic Specification No. 3202 and shall conform to those shown in the Individual Tables 1(a).

4.3.8 Endurance
Not applicable.

4.4 MATERIALS AND FINISHES

4.4.1 General
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.

4.4.2 Body
Aluminium alloy (milled), chromate conversion finish.

4.4.3 Connector Receptacle
Not applicable.

4.4.4 Tab
Not applicable.

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. Each component shall be marked in respect of:

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

4.5.2 Port Identification
Input and Output Port identification shall be as shown in the individual Tables 1(a) and Figure 3.

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

Example: 320202001B

- Detail Specification Number: 3202020
- Type Variant (See Table 1(a)): 01
- Testing Level: B

4.5.4 Traceability Information
Each component shall be marked in respect of traceability information in accordance with the requirements of ESCC Basic Specification No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature
The parameters to be measured at room temperature are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3 ºC.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. Measurements shall be performed at the temperature extremes as defined in Item 8 of the Individual Tables 1(a).

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing electrical measurements are given in ESCC Generic Specification No. 3202.

4.7 BURN-IN TESTS

Not applicable.

TABLE 2 – ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESCC 3202 Test Method And Condition	Limits	
				Min.	Max.
1	Isolation	ISO	Para. 9.7.1.2	Item 3 (1)	
2	Insertion Loss	IL	Para. 9.7.1.3	Item 4 (1)	
3	Return Loss Input Output	RL_{IN} RL_{OUT}	Para. 9.7.1.4	Item 5 (1)	

NOTES

1. See Individual Tables 1(a).

TABLE 3 – ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES

No.	Characteristics	Symbol	ESCC 3202 Test Method And Condition	Limits	
				Min.	Max.
1	Isolation	ISO	Para. 9.7.1.2	Item 3 (1)	
2	Insertion Loss	IL	Para. 9.7.1.3	Item 4 (1)	
3	Return Loss Input Output	RL_{IN} RL_{OUT}	Para. 9.7.1.4	Item 5 (1)	

NOTES

1. See Individual Tables 1(a).

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

Not applicable.

TABLE 4 - PARAMETER DRIFT VALUES

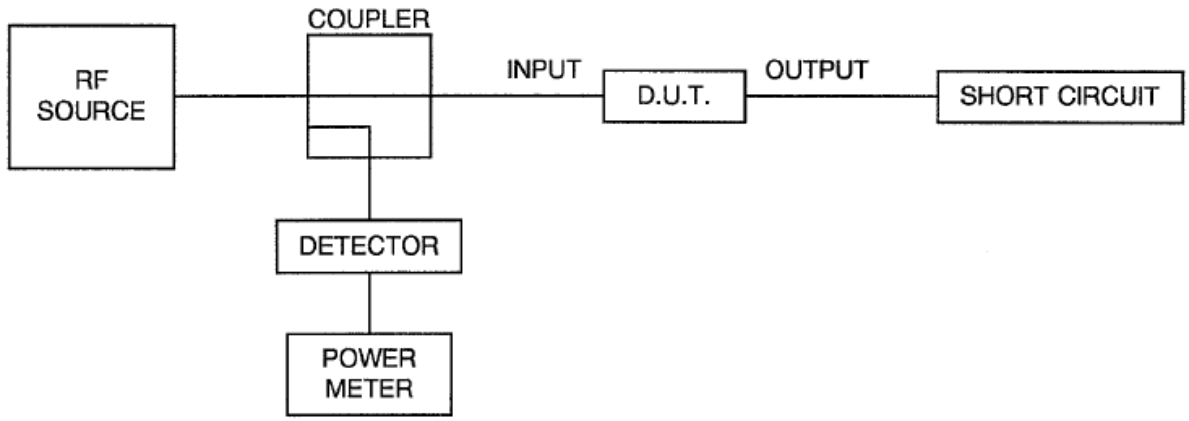
Not applicable.

TABLE 5 - CONDITIONS FOR OPERATING LIFE TEST

No.	Characteristics	Symbol	Condition	Unit
1	Centre Frequency	f_C	Item 1 (1)	GHz
2	Input Power	P	10	GHzW
3	Ambient Temperature	T_{amb}	Higher Temperature of Item 8 (1)	ºC

NOTES
1. See Individual Tables 1(a).

FIGURE 5 - ELECTRICAL CIRCUIT FOR OPERATING LIFE TEST



4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION NO. 3202)

4.8.1 Measurements and Inspections on Completion of Environmental Tests
The parameters to be measured and inspections to be performed on completion of environmental tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at T_{amb} = +22 ±3 °C.

4.8.2 Measurements and Inspections at Intermediate Points and on Completion of Endurance Tests
The parameters to be measured and inspections to be performed during endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at T_{amb} = +22 ±3 °C.

4.8.3 Conditions for Operating Life Tests (Part of Endurance Testing)
The requirements for operating life testing are specified in Section 9 of ESCC Generic Specification No. 3202. The conditions for operating life testing shall be as specified in Table 5 of this specification.

4.8.4 Electrical Circuits for Operating Life Tests
Circuits for use in performing the operating life tests are shown in Figure 5.

TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING

No.	ESCC Generic Specification No. 3202		Measurements And Inspections		Symbol	Limits	Unit
	Environmental And Endurance Tests (1)	Test Method And Conditions	Identification	Conditions			
01	Rapid Change of Temperature	Para. 9.4	Electrical Measurements Visual Examination	Table 2 -		(2) -	
02	Vibration	Para. 9.5	Electrical Measurements Visual Examination	Table 2 -		(2) -	
03	Shock or Bump	Para. 9.16	Electrical Measurements Visual Examination	Table 2 -		(2) -	
04	Permanence of Marking	Para. 9.17	Visual Examination	-		-	
05	Climatic Sequence	Para. 9.18					
	Dry Heat	Para. 9.18.2	Electrical Measurements	Table 3		(2)	
	Cold Test	Para. 9.18.4	Electrical Measurements	Table 3		(2)	
	Low Air Pressure	Para. 9.18.5	3202, Para. 9.18.5	-		3202, Para. 9.18.5	
	Damp Heat	Para. 9.18.6	Electrical Measurements	Table 2		(2)	
06	Corrosion	Para. 9.19	Visual Examination	-		-	
07	Coupling Proof Torque	Para. 9.8	Not applicable	-		-	
08	Endurance	Para. 9.20	Not applicable	-		-	
09	Solderability	Para. 9.21	Not applicable	-		-	
10	Robustness of Terminations	Para. 9.22	Not applicable	-		-	
11	Seal Test	Para. 9.6	Not applicable	-		-	
12	Damp Heat	Para. 9.23	Electrical Measurements Visual Examination	Table 2 -		(2) -	
13	Operating Life	Para. 9.24.1 Para. 9.24.4 Para. 9.24.5	Init. Elec. Measurements Inter. Elec. Measurements Final Elec. Measurements	Table 2 Table 2 Table 2		(2) (2) (2)	
14	Mating and Unmating Forces	Para. 9.9	Not applicable	-		-	
15	Contact Engagement and Separation Forces	Para. 9.13	Not applicable	-		-	

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. See Individual Tables 1(a).

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 01

No.	Characteristics	Symbol	Values		Unit	Remarks
			Min.	Max.		
1	Centre Frequency	f_C	7.5		GHz	
2	Bandwidth	B	0.5	-	GHz	
3	Isolation (Output to Input)	ISO	20	-	dB	Note 1
4	Insertion Loss (Input to Output)	IL	-		dB	Note 1
5	Return Loss Input Output	RL_{IN} RL_{OUT}	19.1 19.1	- -	dB dB	Note 1
6	Weight	-	-	340	g	
7	Interfaces Input Output	- -	154 IEC-UBR 84 154 IEC-UBR 84		- -	Note 2
8	Operating Temperature Range	T_{op}	-30	+90	ºC	T_{amb} (Note 3)
9	Physical Dimensions	A	-	70.3	mm	
		B	-	69.5	mm	
		C	-	48.2	mm	
		D	44.5	45.5	mm	
		E	23.5	24.5	mm	
		F	34.4	35.4	mm	
		G	M4		mm	
		H	5	-	mm	
		J	-	10	mm	
10	Configuration and Functional Diagram	-	Figure 3(f)		-	

NOTES

1. Over the frequency range specified in Items 1 and 2. Bandwidth is symmetrical around the centre frequency.
2. For components with flanges to MIL-F-3922, the applicable reference shall be inserted here. The interface description refers to the flange that the component is intended to mate with.
3. The Operating Temperature Range shall not exceed the Storage Temperature Range.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 02

No.	Characteristics	Symbol	Values		Unit	Remarks
			Min.	Max.		
1	Centre Frequency	f_C	7.5		GHz	
2	Bandwidth	B	0.5	-	GHz	
3	Isolation (Output to Input)	ISO	20	-	dB	Note 1
4	Insertion Loss (Input to Output)	IL	-	0.35	dB	Note 1
5	Return Loss Input Output	RL_{IN} RL_{OUT}	20.8 20.8	- -	dB dB	Note 1
6	Weight	-	-	340	g	
7	Interfaces Input Output	- -	154 IEC-UBR 84 154 IEC-UBR 84		- -	Note 2
8	Operating Temperature Range	T_{op}	-30	+90	ºC	T_{amb} (Note 3)
9	Physical Dimensions	A	-	70.3	mm	
		B	-	69.5	mm	
		C	-	48.2	mm	
		D	44.5	45.5	mm	
		E	23.5	24.5	mm	
		F	34.4	35.4	mm	
		G	M3		mm	
		H	5	-	mm	
		J	-	10	mm	
10	Configuration and Functional Diagram	-	Figure 3(f)		-	

NOTES

1. Over the frequency range specified in Items 1 and 2. Bandwidth is symmetrical around the centre frequency.
2. For components with flanges to MIL-F-3922, the applicable reference shall be inserted here. The interface description refers to the flange that the component is intended to mate with.
3. The Operating Temperature Range shall not exceed the Storage Temperature Range.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 03

No.	Characteristics	Symbol	Values		Unit	Remarks
			Min.	Max.		
1	Centre Frequency	f_C	18.1		GHz	
2	Bandwidth	B	0.8	-	GHz	
3	Isolation (Output to Input)	ISO	20	-	dB	Note 1
4	Insertion Loss (Input to Output)	IL	-	0.5	dB	Note 1
5	Return Loss Input Output	RL_{IN} RL_{OUT}	19.1 19.1	- -	dB dB	Note 1
6	Weight	-	-	51	g	
7	Interfaces Input Output	- -	154 IEC-UBR 220 154 IEC-UBR 220		- -	Note 2
8	Operating Temperature Range	T_{op}	-30	+90	ºC	T_{amb} (Note 3)
9	Physical Dimensions	A	-	32	mm	
		B	-	38.6	mm	
		C	-	23.5	mm	
		D	26.5	27.5	mm	
		E	11.3	11.6	mm	
		F	18.85	19.25	mm	
		G	M4		mm	
		H	3.8	-	mm	
		J	-	7.6	mm	
10	Configuration and Functional Diagram	-	Figure 3(f)		-	

NOTES

1. Over the frequency range specified in Items 1 and 2. Bandwidth is symmetrical around the centre frequency.
2. For components with flanges to MIL-F-3922, the applicable reference shall be inserted here. The interface description refers to the flange that the component is intended to mate with.
3. The Operating Temperature Range shall not exceed the Storage Temperature Range.