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Pages 1 to 39

RF COUPLERS, UNSEALED,

SMA CONNECTORS, 4-30 dB, 1 - 22 GHz,

ESA/SCC Detail Specification No. 3404/005

space components
coordination group

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APPENDICES (applicable to specific Manufacturers only).

None.

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for RF Couplers, Unsealed, SMA Connectors, 4-30 dB, 1-22 GHz. It shall be read in conjunction with ESA/SCC Generic Specification No. 3404, Couplers, RF, Coaxial, the requirements of which are supplemented herein.

1.2 TYPE VARIANTS

A list of variants of the basic type couplers 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 couplers, optimised for the intended application.

The specific characteristics shall be negotiated between the Manufacturer and the Orderer. The Manufacturer shall then apply to the ESA/SCC Secretariat for a type variant number for each individual coupler concerned, by sending a finalised Table 1(a) which shall also be copied to the Qualifying Space Agency (QSA).

1.3 MAXIMUM RATINGS

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

1.4 PARAMETER DERATING INFORMATION

The derating information for the couplers specified herein is shown in Figure 1.

1.5 PHYSICAL DIMENSIONS

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

1.6 FUNCTIONAL DIAGRAM

The functional diagram of the couplers specified herein is shown in Figure 3.

1.7 STORAGE PRECAUTIONS

These components being unsealed require protection against humidity as specified in Para. 4.2 of ESA/SCC Basic Specification No. 20600.

TABLE 1(a) - TYPE VARIANT SUMMARY (1)

VARIANT	FREQUENCY RANGE (GHz)		COUPLING FACTOR (dB)	
	MIN	MAX	MIN	MAX
01	1	2	5.5	6.5
02	1	2	9.5	10.5
03	1	2	19.5	20.5
04	1	2	29.5	30.5
05	2	4	5.5	6.5
06	2	4	9.5	10.5
07	2	4	19.5	20.5
08	2	4	29	31
09	4	8	5.5	6.5
10	4	8	9.5	10.5
11	4	8	19.5	20.5
12	4	8	29	31
13	8	12.4	5.5	6.5
14	8	12.4	9.25	10.75
15	8	12.4	19.5	20.5
16	8	12.4	29	31
17	12.4	18	5.5	6.5
18	12.4	18	9.5	10.5
19	12.4	18	19.5	20.5
20	18	22	9.5	10.5
21	18	22	15	17
22	2.003	2.053	29	31
23	3.7	4.2	See Figure 2	

NOTES

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

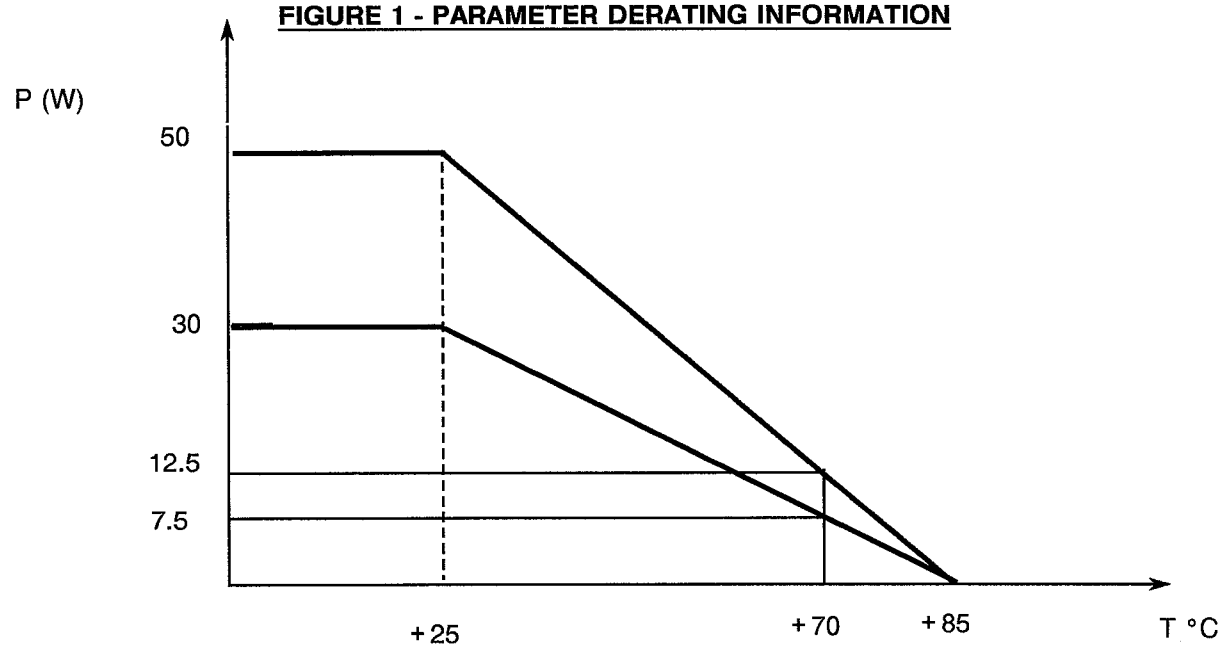
TABLE 1(b) - MAXIMUM RATINGS

NO.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS		UNITS
			MIN	MAX	
1	RF Power	P		50 30	W (1) W (2)
2	Operating Temperature Range	T_{op}	See Figure 2		°C
4	Storage Temperature Range	T_{stg}	-40	+85	°C (3)

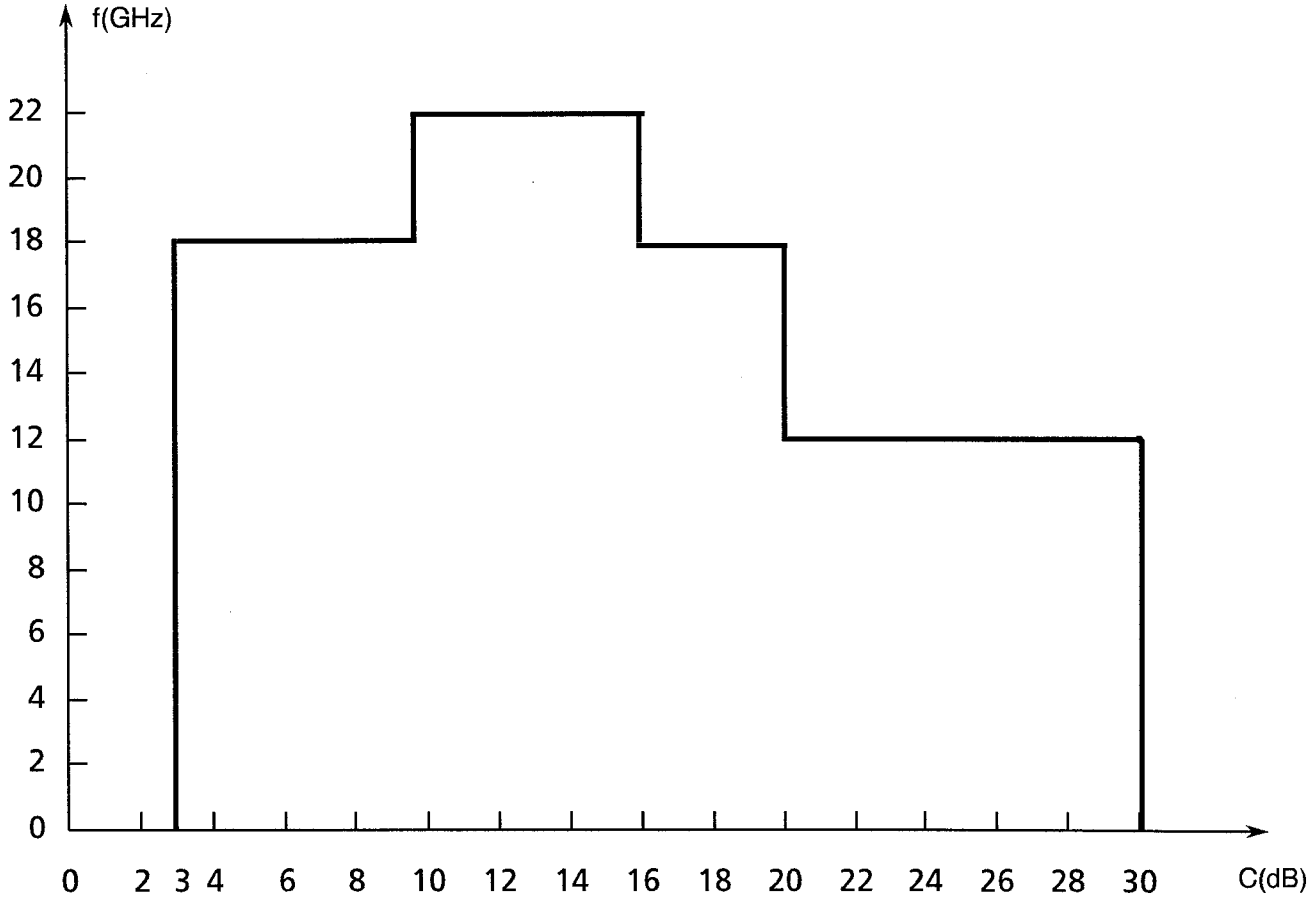
NOTES

1. See Figure 1.
2. From 18 to 22 GHz. See Figure 1.
3. Temperatures to be used for Thermal Cycling are specified in Para. 9.2 of ESA/SCC Generic Specification No. 3404.

FIGURE 1 - PARAMETER DERATING INFORMATION



(a) RF POWER VERSUS TEMPERATURE

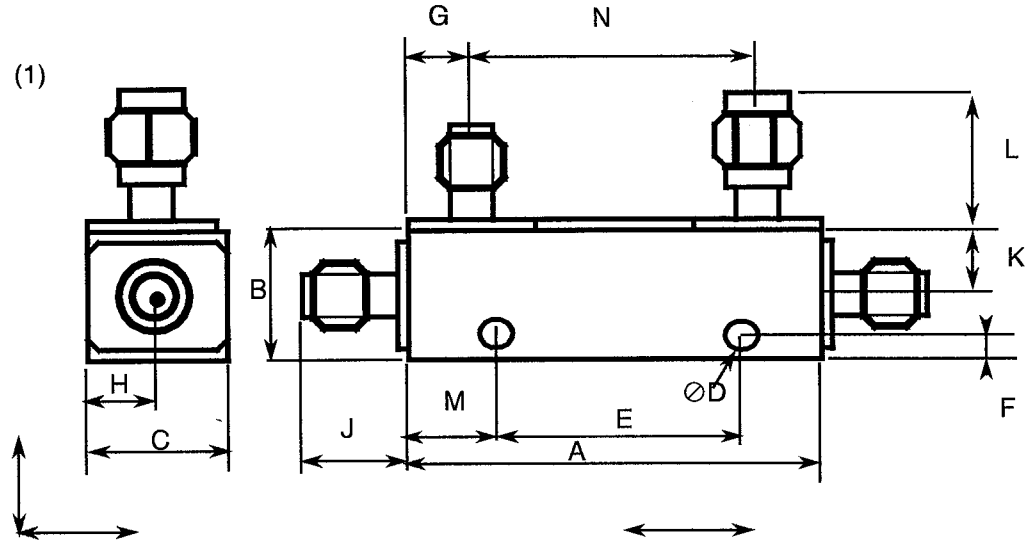


(b) COUPLING (NOMINAL VALUES) VERSUS FREQUENCY

TABLE 1(c) - FORMAT FOR INDIVIDUAL TABLES 1(a)
TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No.

(1)



No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF			dB
2	Coupling Variation	CV			dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -		- -
4	Insertion Loss (3)	IL	-		dB
5	Directivity	DIR		-	dB
6	Frequency Range	f			GHz
7	RF Power	P	-		W
8	RF Leakage	E		-	dB
9	Weight	W	-		g
10	Interfaces Input Output Coupled Output	- - -	340200XXXB Char XXX(2) 340200XXXB Char XXX(2) 340200XXXB Char XXX(2)		- - -
11	Operating Temperature Range	Top			°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N			mm

NOTES: See Page 9.

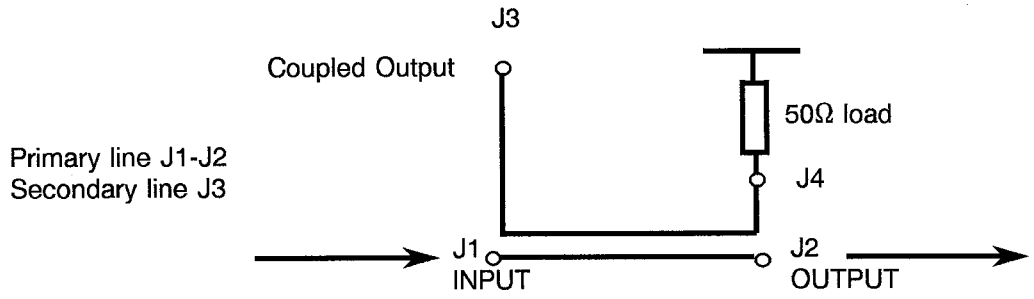
NOTES TO TABLES 1(a) AND 1(c)

1. Drawing shown as an example only.
2. The missing information shall be derived as follows:
   - The first X denotes the last figure of the Detail Specification Number.
   - The next XX denotes the Variant Number selected.
   - The final XXX denotes the Characteristics selected.
3. Insertion Loss: Excluding coupling power loss.

FIGURE 2 - PHYSICAL DIMENSIONS

See Tables 1(a)

FIGURE 3 - FUNCTIONAL DIAGRAM



2. APPLICABLE DOCUMENTS

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

(a) ESA/SCC Generic Specification No. 3404, Power Dividers,Couplers, RF, Coaxial.

(b) ESA/SCC Detail Specification No. 3402/001, RF Coaxial Connectors, Type SMA (Male Contacts).

(c) ESA/SCC Detail Specification No. 3402/002, RF Coaxial Connectors, Type SMA (Female Contacts).

(d) IEC Publication 410, Sampling Procedures and Tables for Inspection by Attributes.

(e) ESA PSS-01-702, A Thermal Vacuum Test for the Screening of Space Materials.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

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

In addition, the following symbols shall be used :

CF : Coupling Factor
CV : Coupling Variation
RL : VSWR
RLp : VSWR on primary line
RLs : VSWR on secondary line
IL : Insertion Loss
DIR : Directivity
E : RF Leakage
W : Weight

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the couplers specified herein are stated in this specification and ESA/SCC Generic Specification No. 3404, Power Dividers, Couplers, RF, Coaxial. 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 ESA/SCC 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)

None.

4.2.3 Deviations from Burn-in Tests (Chart III)

None.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Paras. 9.10.3 and 9.10.6, Damp Heat, Accelerated: Not applicable.

(b) Para. 9.11, Corrosion : Not applicable.

(c) Para. 9.13, RF Leakage: Shall be performed.

(d) Para. 9.16, Peak Power : Not applicable.

(e) Subgroup III : Add Para. 9.5.3, Electrical Measurements at High and Low Temperatures after the Power Level Test.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Paras. 9.10.3 and 9.10.6, Damp Heat, Accelerated: Not applicable.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the couplers specified herein shall be verified in accordance with the requirements set out in Para 9.18 of ESA/SCC Generic Specification No. 3404 and shall conform to those shown in the Tables 1(a) of this specification.

4.3.2 Weight

The maximum weight of the couplers specified herein shall be as specified in the Tables 1(a) of this specification.

4.3.3 Female Contact Retention

The requirements for this test are specified in Para 9.6 of ESA/SCC Generic Specification No. 3404. Female contacts shall be capable of meeting the requirements of Para 4.3.8. (c) of ESA/SCC Detail Specification No. 3402/002.

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 couplers 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 Connector Receptacles

As per ESA/SCC Detail Specifications 3402/001 or 3402/002 and as specified in the Tables 1(a) of this specification.

4.4.2 Body

The body shall be made of aluminium. The finish shall be a matt black paint meeting the outgassing requirements of ESA-PSS-01-702. A 7mm diameter area without paint shall be left at each mounting hole on both sides of the body or flange.

4.4.3 Load Termination

3403004XB as per ESA/SCC Detail Specification 3403/004. See Tables 1(a) at the end of this specification for applicability.

4.5 MARKING

4.5.1 General

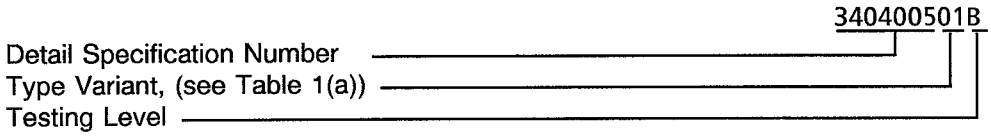
The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700 and the following subparagraphs. Each component shall be marked in respect of:-

(a) The SCC Component Number.

(b) Traceability Information.

4.5.2 The SCC Component Number

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



4.5.3 Traceability Information

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

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.6.2 Electrical Measurements at High and Low Temperatures (Table 3)

The parameters to be measured at high and low temperatures are scheduled in Table 3. Unless otherwise specified, the measurements shall be performed at the operating temperature extremes specified in the individual Tables 1(a) at the end of this specification.

4.6.3 Circuit for Electrical Measurements

Circuits for electrical measurements are given in ESA/SCC Generic Specification No. 3404.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN	MAX	
1	Coupling Factor J1-J3	CF	ESA/SCC No 3404, Para 9.5.1.1.1	Para. 9.5.1.1.1 Input ≤ 10mW	See Figure 2		-
2	Coupling Variation	CV	ESA/SCC No 3404, Para 9.5.1.1.2	Para. 9.5.1.1.2 Input ≤ 10mW	See Figure 2		-
3	VSWR	RL	ESA/SCC No 3404, Para 9.5.1.1.3	Para. 9.5.1.1.3 Input ≤ 10mW	See Figure 2		-
4	Insertion Loss	IL	ESA/SCC No 3404, Para 9.5.1.1.4	Para. 9.5.1.1.4 Input ≤10mW	See Figure 2		-
5	Directivity	DIR	ESA/SCC No 3404, Para 9.5.1.1.5	Para. 9.5.1.1.5 Input ≤ 10mW	See Figure 2		-

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES (1)

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN	MAX	
1	Coupling Factor J1-J3	CF	ESA/SCC No 3404, Para 9.5.1.1.1	Para. 9.5.1.1.1 Input ≤ 10mW	See Figure 2		-
4	Insertion Loss	IL	ESA/SCC No 3404, Para 9.5.1.1.4	Para. 9.5.1.1.4 Input ≤ 10mW	See Figure 2		-
5	Directivity	DIR	ESA/SCC No 3404, Para 9.5.1.1.5	Para. 9.5.1.1.5 Input ≤ 10mW	See Figure 2		-

NOTES

1. Sampling IEC Publication 410 General Inspection Level II AQL 1.5%.
2. The high and low temperatures shall be as specified in Figure 2.

4.7 BURN-IN AND ELECTRICAL MEASUREMENTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise specified, these measurements shall be performed at T_{amb} = +22 ± 3 °C.

The parameter drift value (Δ) applicable to the parameter scheduled shall not be exceeded. In addition to these drift value requirements, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in

The requirements for burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 3404. The conditions for burn-in shall be as specified in Table 5(a) of this specification.

Upon completion of burn-in, a recovery period of 24 ± 2 hours is necessary before performance of the end measurements.

4.7.3 Electrical Circuit for Burn-in

Not applicable.

TABLE 4 - PARAMETER DRIFT VALUES

No	CHARACTERISTICS	SYMBOL	TEST METHOD AND CONDITIONS	LIMITS	UNIT
1	Coupling J1-J3 Drift	ΔCF	ESA/SCC No. 3404 Para 9.5.1.1.1 Input ≤ 10mW	±0.1	dB
5	Insertion Loss Drift	ΔIL	ESA/SCC No. 3404 Para 9.5.1.1.4 Input ≤ 10mW	±0.1	dB

TABLE 5(a) - CONDITIONS FOR BURN-IN

No	CHARACTERISTICS	SYMBOL	LIMITS	UNIT
1	Input Power	P	0	W
2	High Temperature	T	+85 (-0 +5)	°C

TABLE 5(b) - CONDITIONS FOR OPERATING LIFE TEST

No	CHARACTERISTICS	SYMBOL	LIMITS	UNIT
1	RF Power	P	See Figure 1 and Tables 1(a)	W(1, 2)
2	Ambient Temperature	T	+70	°C

NOTES
1. The coupler shall have the same DC power rating as the RF power rating of the ordered component.
2. Applicable only if RF power rating is >5W. If P is smaller than 5W, then use P=0 or Tstg=85°C.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (Charts IV and V of ESA/SCC Generic Specification No. 3404)

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 specified, the measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.2 Measurements and Inspections at Intermediate Points during Endurance Tests

The parameters to be measured and inspections to be performed at intermediate points during endurance tests are scheduled in Table 6. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.3 Measurements and Inspections on Completion of Endurance Tests

The parameters to be measured and inspections to be performed on completion of endurance tests shall be those specified in Table 6. Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ± 3 °C.

4.8.4 Conditions for Operating Life Test (Part of Endurance Testing)

The requirements for operating life test are specified in Section 9 of ESA/SCC Generic Specification No. 3404. The conditions for operating life test shall be as specified in Table 5(b) of this specification.

4.8.5 Electrical Circuits for Operating Life Test

Not applicable.

4.8.6 Conditions for High Temperature Storage Test (Part of Endurance Testing)

The requirements for high temperature storage test are specified in Section 9 of ESA/SCC Generic Specification No. 3404.

The conditions for high temperature storage testing shall be as specified in Table 5(a) of this specification.

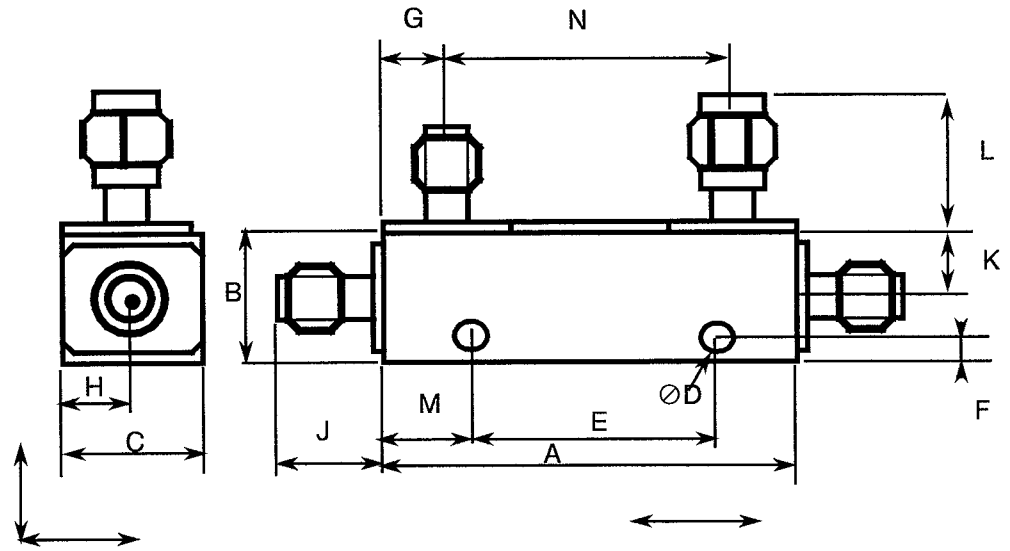
TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING

NO.	ESA/SCC GENERIC SPEC. No. 3404		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND COND.	IDENTIFICATION	CONDITIONS		MIN	MAX	
01	Vibration	Para 9.7	Visual Examination	-		-	-	-
02	Shock or Bump	Para 9.8	Electrical Measur. Visual Examination	Table 2 Damage		Tables 1(a) -	- -	- -
03	Rapid Change of Temperature	Para 9.9	After 24 ±2 hours Electrical Measur. Visual Examination	 Table 2 Damage		 Tables 1(a)		-
04	Climatic Sequence Dry Heat Damp Heat, Accelerated Cold Test Low Air Pressure Damp Heat, Accelerated Final Measurements	Para 9.10 Para 9.10.2 Para 9.10.3 Para 9.10.4 Para 9.10.5 Temp + 35°C Power see Figure 1 Para 9.10.6 Para 9.10.7	 Electrical Measur. Not applicable At low Temperat. Electrical Measur. Not applicable After 1 to 24 hours Electrical Measur. Visual Inspection	 Table 3 Table 3 - Table 2 Mechanical Damage		 Tables 1(a) Tables 1(a) - Tables 1(a) -	 - - -	- - - - - -
05	Corrosion	Para 9.11	Not applicable	-		-	-	-
06	Operating Life	Para 9.12 Table 5(b)	 Electrical Measur. Electrical Measur. Visual Examination	At 168, 500 & 1000 Hours Table 4 At 1000 Hours Table 2 Damage		 Table 4 Tables 1(a) -	 - -	 - - -
07	RF Leakage	Para 9.13	RF Leakage	Para 9.13		Tables 1(a)		-
08	Power Level	Para 9.14	Electrical Measur.	Table 2		Tables 1(a)		-
09	High Temperature Storage	Para 9.15 Table 5(a)	 Contact Resist. Electrical Measur. Visual Examination	At 1000 Hours Gen. 3404 Para 9.15 Table 2 -	 ΔRc / Rc 	 Table 4 Tables 1(a) -	 - -	 - - -
10	Peak Power	Para 9.16	Not applicable					
11	Perman. of Marking	Para 9.17	-	-		-	-	-
12	Dimension Check	Para 9.18	Dimensions	-		Tables 1(a)		-
13	Weight	Para 9.19	Weight	-		Tables 1(a)		-

NOTES 1. The tests in this Table refer to either Chart IV or V and shall be used as applicable.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 01

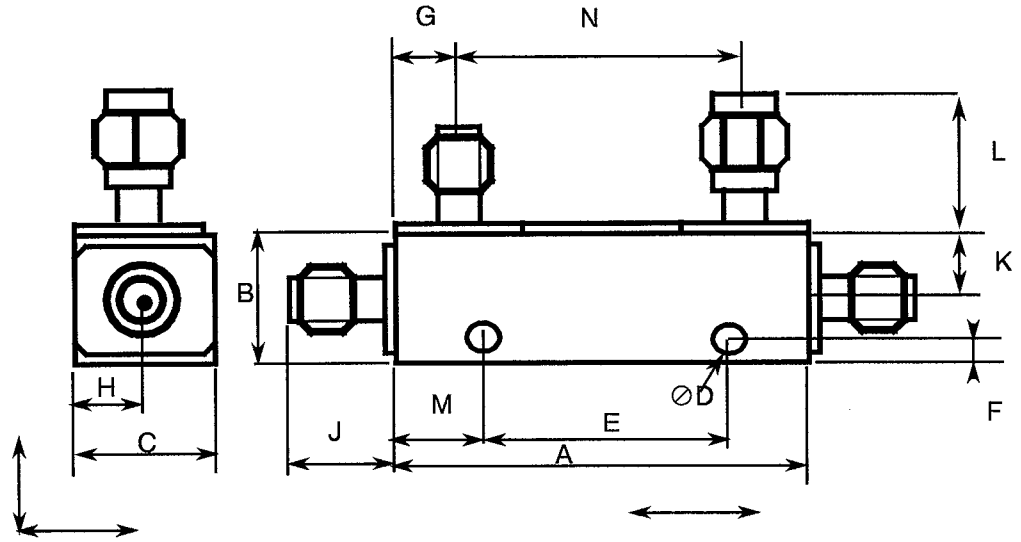


No	CHARACTERISTICS	SYMBOL	VALUES MIN	VALUES MAX	UNIT
1	Coupling Factor	CF	5.5	6.5	dB
2	Coupling Variation	CV	-0.6	+0.6	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.15 1.15	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	22	-	dB
6	Frequency Range	f	1	2	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	50	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	50.3 14.5 12.5 2.5 33.5 1.7 6.7 6 9 7.7 - 7.9 35.9	51.3 15.5 13.5 2.7 34.5 2.7 7.7 7 10 8.7 20 8.9 36.9	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 02

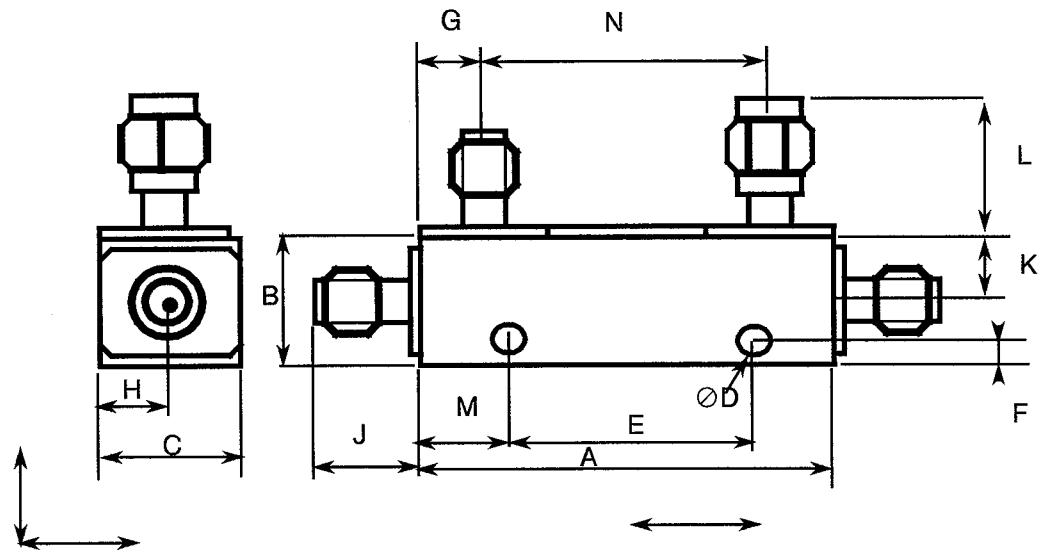


No	CHARACTERISTICS	SYMBOL	VALUES MIN	VALUES MAX	UNIT
1	Coupling Factor	CF	9.5	10.5	dB
2	Coupling Variation	CV	-0.75	+0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.15 1.15	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	22	-	dB
6	Frequency Range	f	1	2	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	50	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	50.3 14.5 12.5 2.5 33.5 1.7 6.7 6 9 7.7 - 7.9 35.9	51.3 15.5 13.5 2.7 34.5 2.7 7.7 7 10 8.7 20 8.9 36.9	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 03

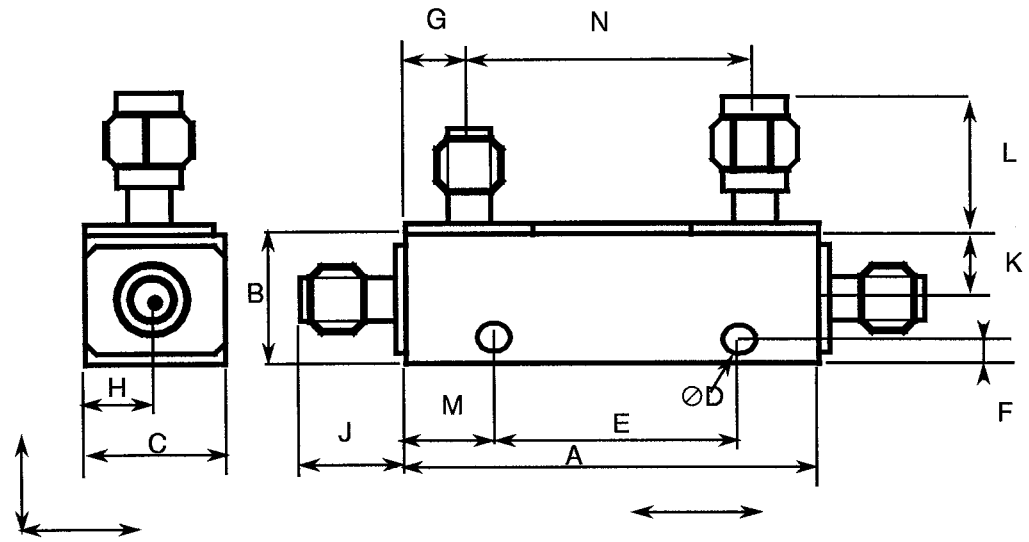


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	19.5	20.5	dB
2	Coupling Variation	CV	-0.75	+0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.15 1.15	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	22	-	dB
6	Frequency Range	f	1	2	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	50	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	50.3 14.5 12.5 2.5 33.5 1.7 6.7 6 9 7.7 - 7.9 35.9	51.3 15.5 13.5 2.7 34.5 2.7 7.7 7 10 8.7 20 8.9 36.9	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 04

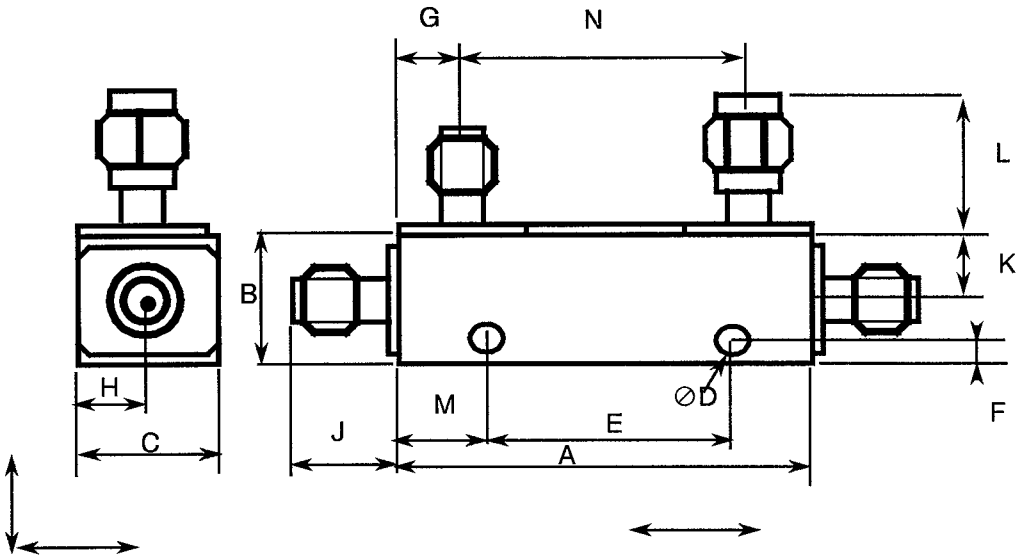


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	29.5	30.5	dB
2	Coupling Variation	CV	-0.75	+0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.15 1.15	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	22	-	dB
6	Frequency Range	f	1	2	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	50	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	50.3 14.5 12.5 2.5 33.5 1.7 6.7 6 9 7.7 - 7.9 35.9	51.3 15.5 13.5 2.7 34.5 2.7 7.7 7 10 8.7 20 8.9 36.9	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 05

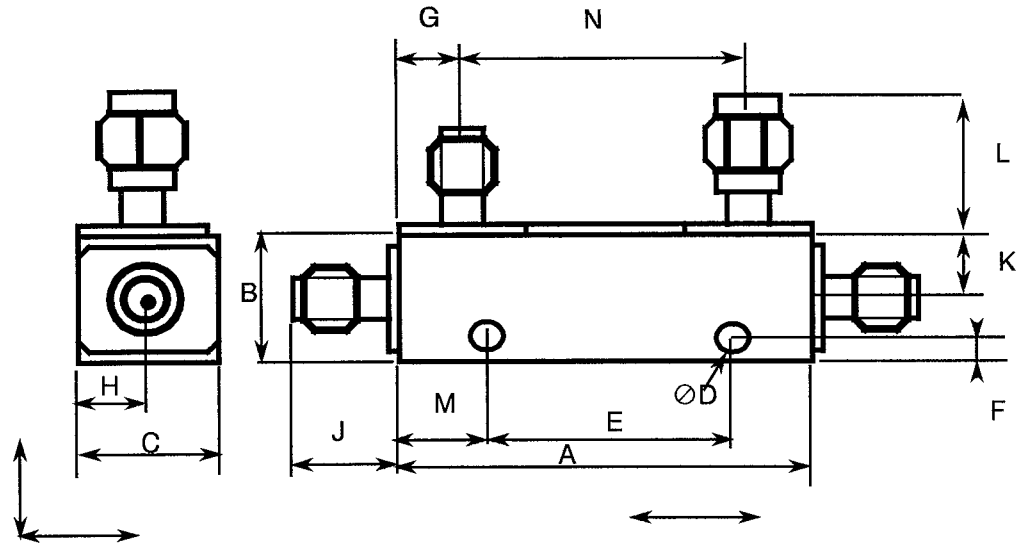


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	5.5	6.5	dB
2	Coupling Variation	CV	-0.6	+0.6	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.20 1.20	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	20	-	dB
6	Frequency Range	f	2	4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	40	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	30 14.5 12.5 2.5 8 1.7 6.5 6 9 7.7 - 10 16	31 15.5 13.5 2.7 9.5 2.7 8 7 10 8.7 20 12 17	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 06

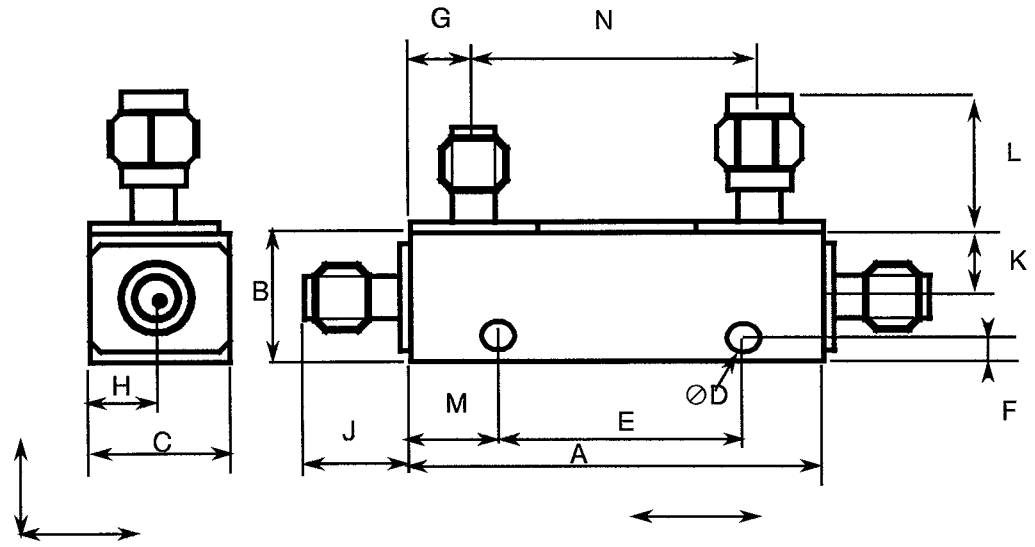


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	9.5	10.5	dB
2	Coupling Variation	CV	-0.75	+ 0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.20 1.20	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	20	-	dB
6	Frequency Range	f	2	4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	40	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	30 14.5 12.5 2.5 8 1.7 6.5 6 9 7.7 - 10 16	31 15.5 13.5 2.7 9.5 2.7 8 7 10 8.7 20 12 17	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 07

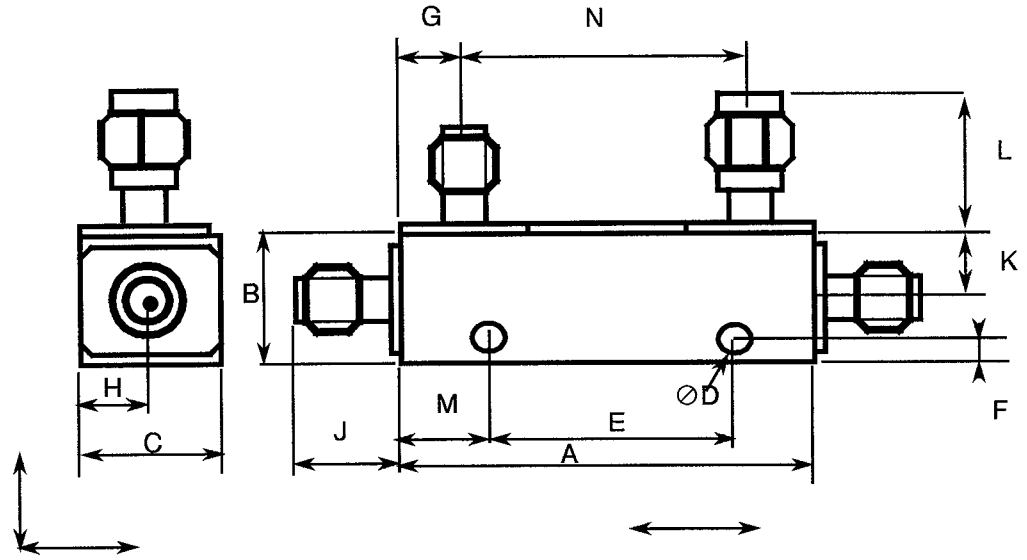


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	19.5	20.5	dB
2	Coupling Variation	CV	-0.75	+ 0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.20 1.20	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	20	-	dB
6	Frequency Range	f	2	4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	40	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	30 14.5 12.5 2.5 8 1.7 6.5 6 9 7.7 - 10 16	31 15.5 13.5 2.7 9.5 2.7 8 7 10 8.7 20 12 17	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 08

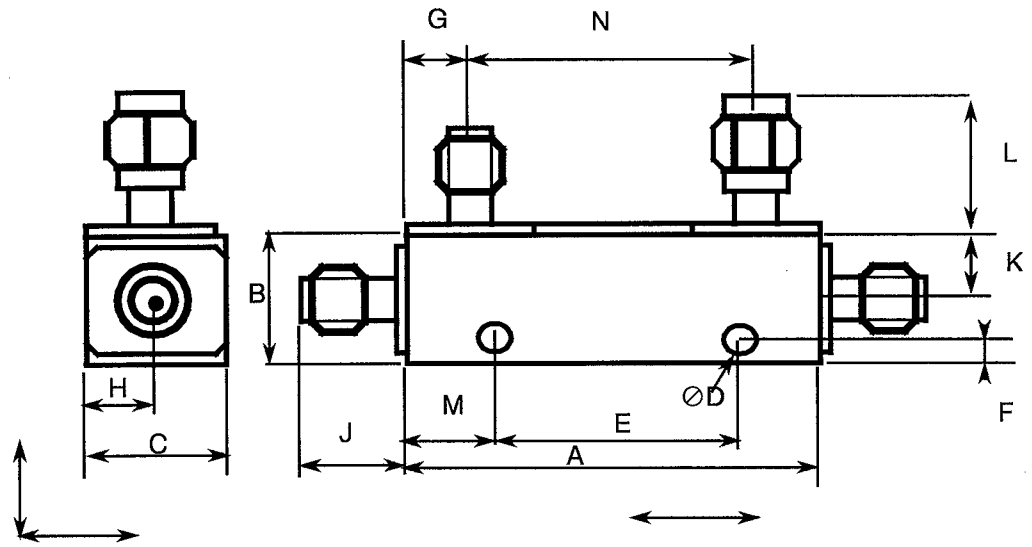


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	29	31	dB
2	Coupling Variation	CV	-0.75	+ 0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.20 1.20	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	20	-	dB
6	Frequency Range	f	2	4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	40	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	30 14.5 12.5 2.5 8 1.7 6.5 6 9 7.7 - 10 16	31 15.5 13.5 2.7 9.5 2.7 8 7 10 8.7 20 12 17	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 09

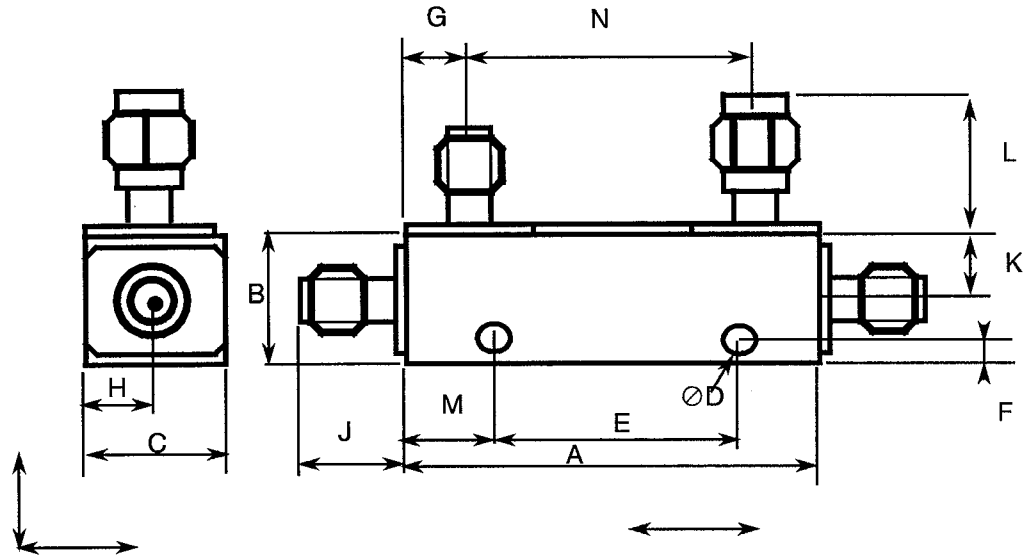


No	CHARACTERISTICS	SYMBOL	VALUES MIN	VALUES MAX	UNIT
1	Coupling Factor	CF	5.5	6.5	dB
2	Coupling Variation	CV	-0.6	+ 0.6	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.25 1.25	- -
4	Insertion Loss	IL	-	0.25	dB
5	Directivity	DIR	18	-	dB
6	Frequency Range	f	4	8	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 10

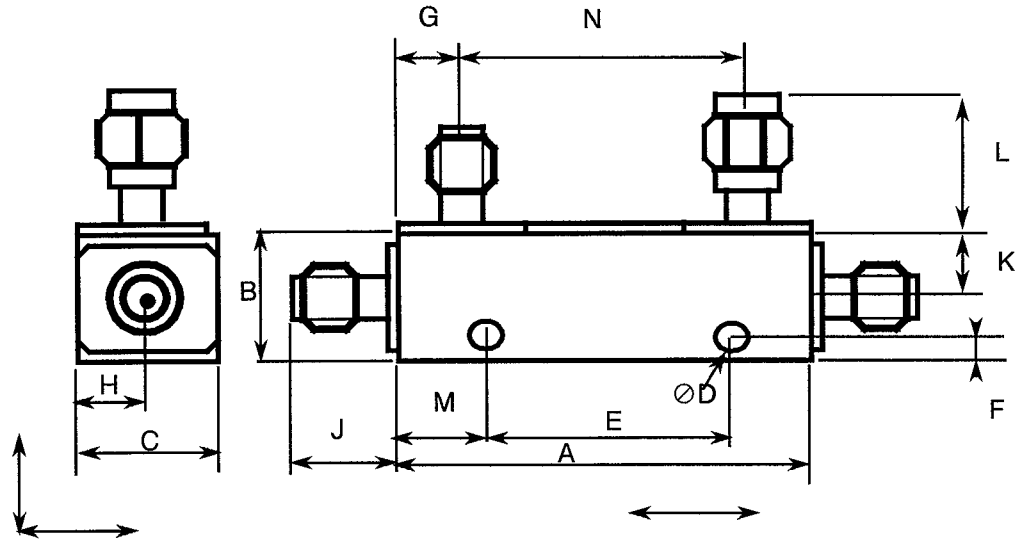


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	9.5	10.5	dB
2	Coupling Variation	CV	-0.75	+ 0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.25 1.25	- -
4	Insertion Loss	IL	-	0.25	dB
5	Directivity	DIR	18	-	dB
6	Frequency Range	f	4	8	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 11

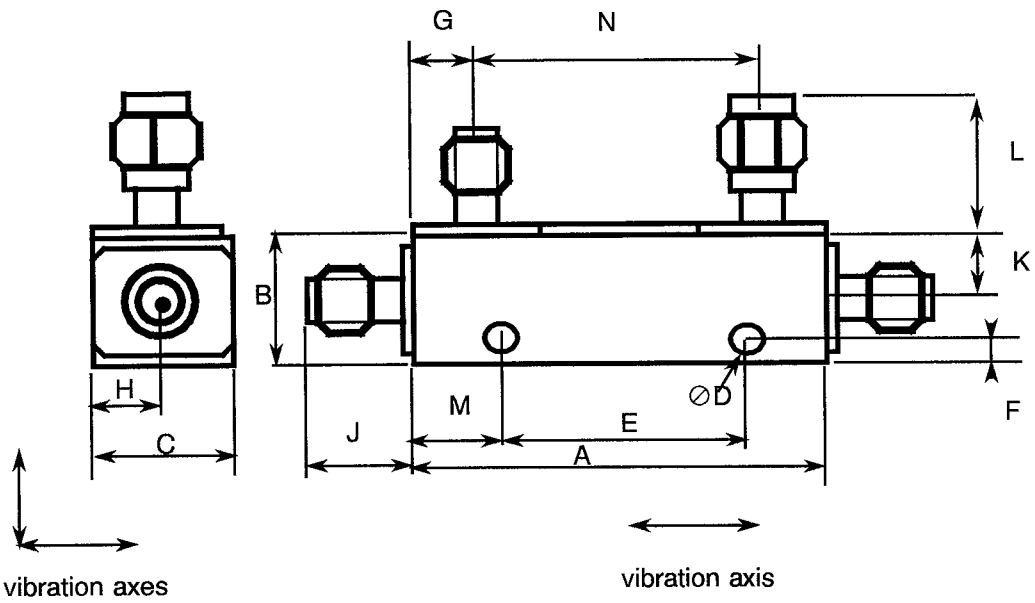


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	19.5	20.5	dB
2	Coupling Variation	CV	-0.75	+ 0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.25 1.25	- -
4	Insertion Loss	IL	-	0.25	dB
5	Directivity	DIR	18	-	dB
6	Frequency Range	f	4	8	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 12

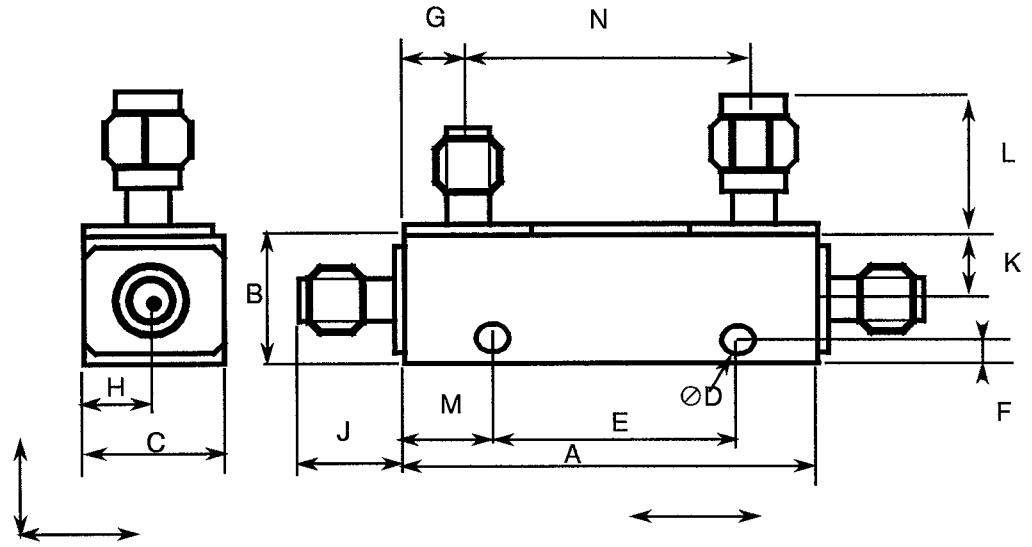


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	29	31	dB
2	Coupling Variation	CV	-0.75	+0.75	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.25 1.25	- -
4	Insertion Loss	IL	-	0.25	dB
5	Directivity	DIR	18	-	dB
6	Frequency Range	f	4	8	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 13

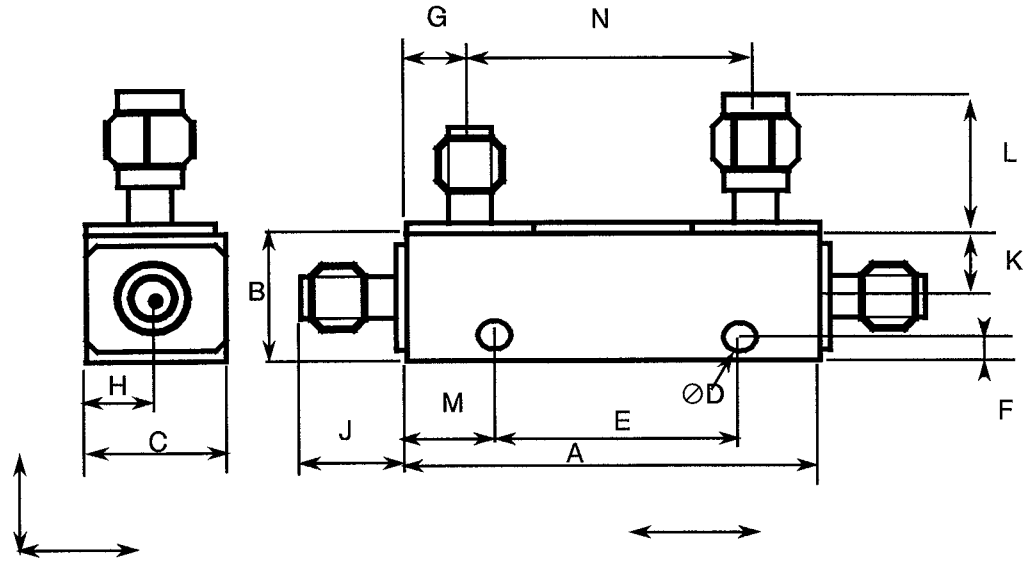


No	CHARACTERISTICS	SYMBOL	VALUES MIN	VALUES MAX	UNIT
1	Coupling Factor	CF	5.5	6.5	dB
2	Coupling Variation	CV	-0.5	+0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.30 1.30	- -
4	Insertion Loss	IL	-	0.4	dB
5	Directivity	DIR	17	-	dB
6	Frequency Range	f	8	12.4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 14

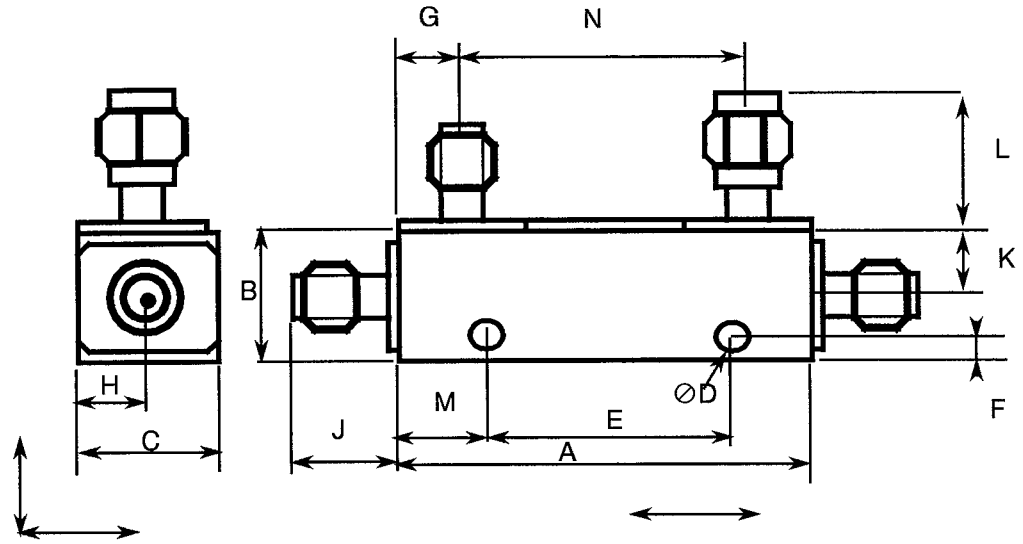


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	9.25	10.75	dB
2	Coupling Variation	CV	-0.5	+0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.30 1.30	- -
4	Insertion Loss	IL	-	0.4	dB
5	Directivity	DIR	17	-	dB
6	Frequency Range	f	8	12.4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 15

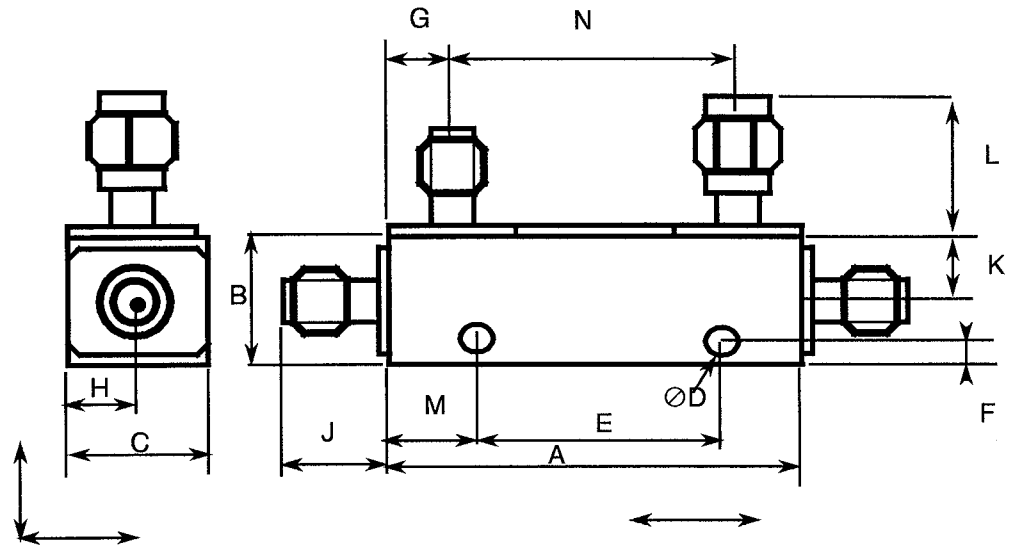


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	19.5	20.5	dB
2	Coupling Variation	CV	-0.5	+ 0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.30 1.30	- -
4	Insertion Loss	IL	-	0.4	dB
5	Directivity	DIR	17	-	dB
6	Frequency Range	f	8	12.4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 16

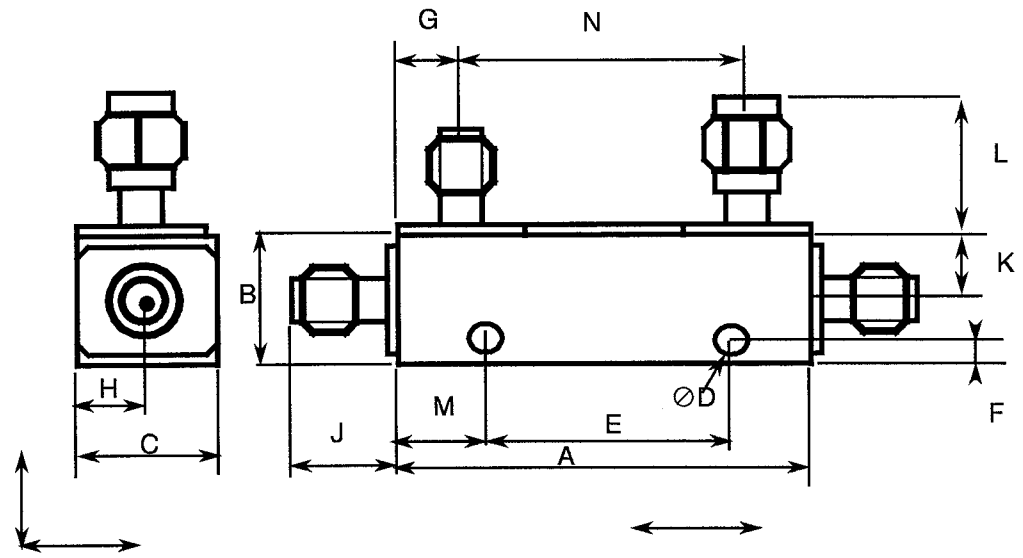


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	29	31	dB
2	Coupling Variation	CV	-0.5	+0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.30 1.30	- -
4	Insertion Loss	IL	-	0.4	dB
5	Directivity	DIR	17	-	dB
6	Frequency Range	f	8	12.4	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 17 13.5 2.7 0 2.7 7 7 10 10.5 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 17

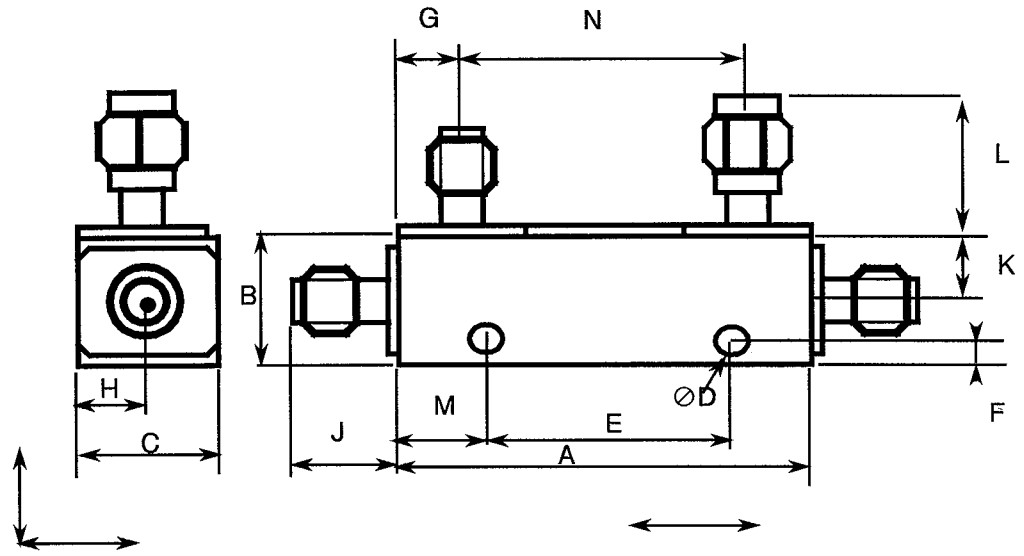


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	5.5	6.5	dB
2	Coupling Variation	CV	-0.5	+0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.35 1.40	- -
4	Insertion Loss	IL	-	0.55	dB
5	Directivity	DIR	15	-	dB
6	Frequency Range	f	12.4	18	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 18

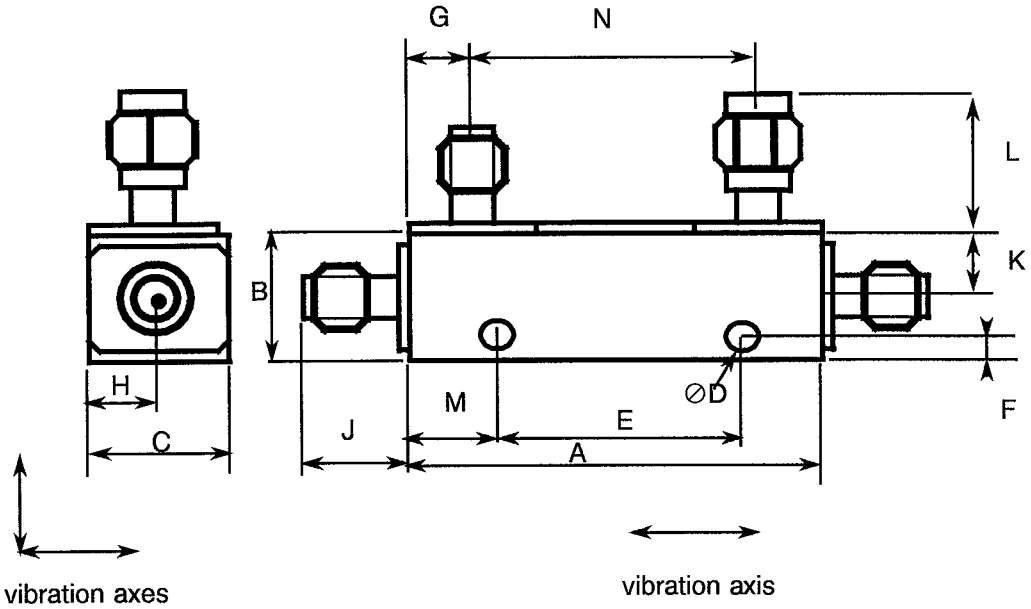


No	CHARACTERISTICS	SYMBOL	VALUES MIN	VALUES MAX	UNIT
1	Coupling Factor	CF	9.5	10.5	dB
2	Coupling Variation	CV	-0.5	+0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.35 1.40	- -
4	Insertion Loss	IL	-	0.55	dB
5	Directivity	DIR	15	-	dB
6	Frequency Range	f	12.4	18	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⊘D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 19

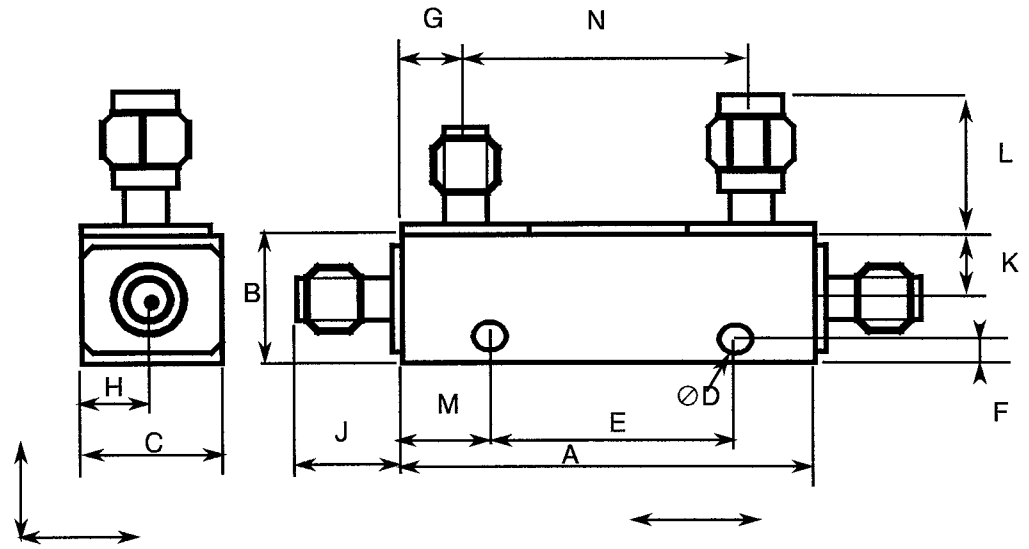


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	19.5	20.5	dB
2	Coupling Variation	CV	-0.5	+ 0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.35 1.40	- -
4	Insertion Loss	IL	-	0.55	dB
5	Directivity	DIR	15	-	dB
6	Frequency Range	f	12.4	18	GHz
7	RF Power	P	-	50	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	30	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+ 85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	25.1 14.5 12.5 2.5 0 1.7 6 6 9 7.8 - 12.3 12.2	26.1 15.5 13.5 2.7 0 2.7 7 7 10 8.8 20 13.3 13.2	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 20

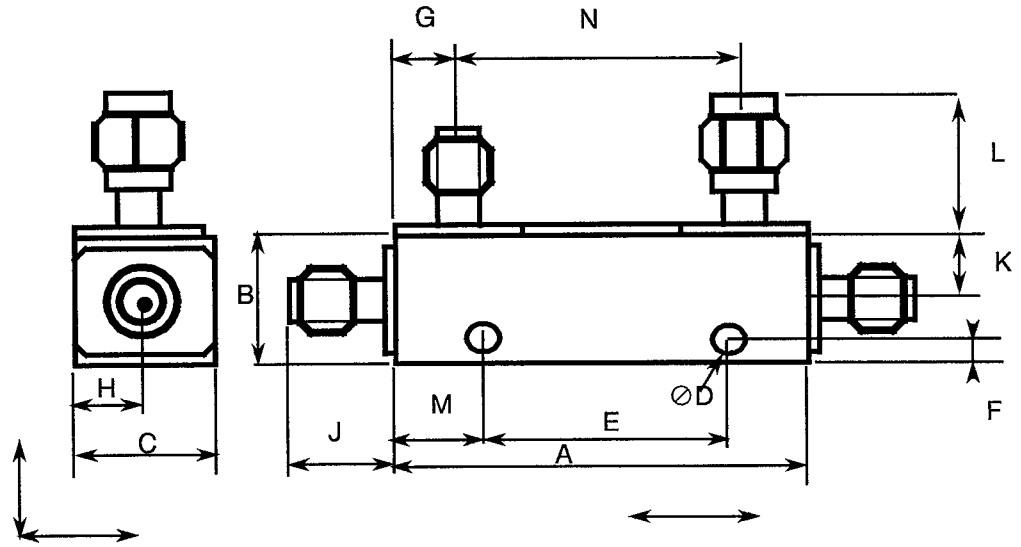


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	9.5	10.5	dB
2	Coupling Variation	CV	-0.5	+0.5	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.40 1.50	- -
4	Insertion Loss	IL	-	0.7	dB
5	Directivity	DIR	15	-	dB
6	Frequency Range	f	18	22	GHz
7	RF Power	P	-	30	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	35	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	26.4 15.5 12.5 2.5 0 1.7 5 6 9 9 - 13 13.7	27.4 16.5 13.5 3 0 3 7 7 10 10 25 14 14.7	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 21

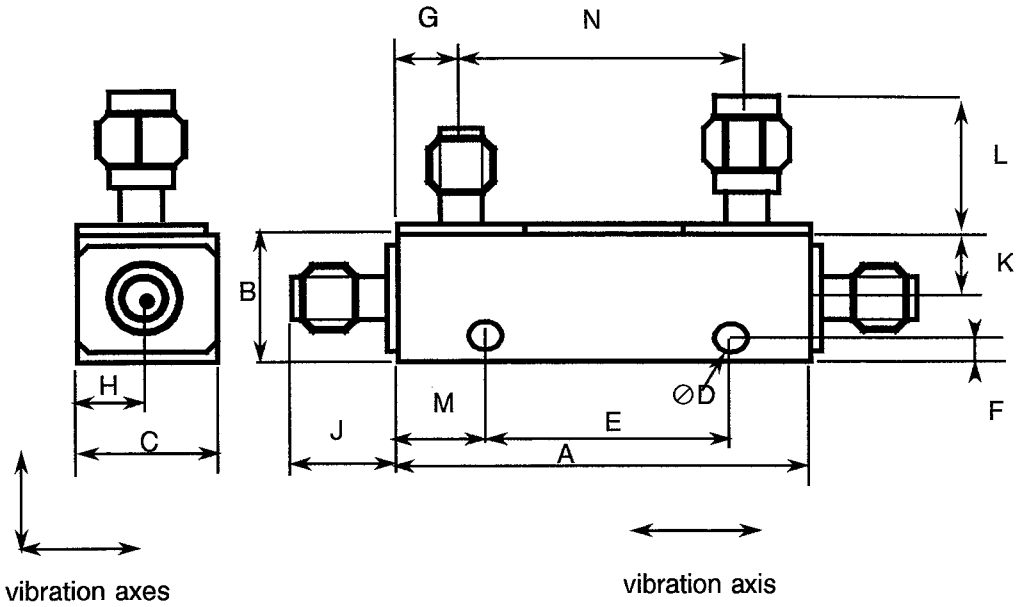


No	CHARACTERISTICS	SYMBOL	VALUES MIN	VALUES MAX	UNIT
1	Coupling Factor	CF	15	17	dB
2	Coupling Variation	CV	-0.8	+0.8	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.40 1.50	- -
4	Insertion Loss	IL	-	0.7	dB
5	Directivity	DIR	13	-	dB
6	Frequency Range	f	18	22	GHz
7	RF Power	P	-	30	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	35	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	26.4 15.5 12.5 2.5 0 1.7 5 6 9 9 - 13 13.7	27.4 16.5 13.5 3 0 3 7 7 10 10 25 14 14.7	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 22

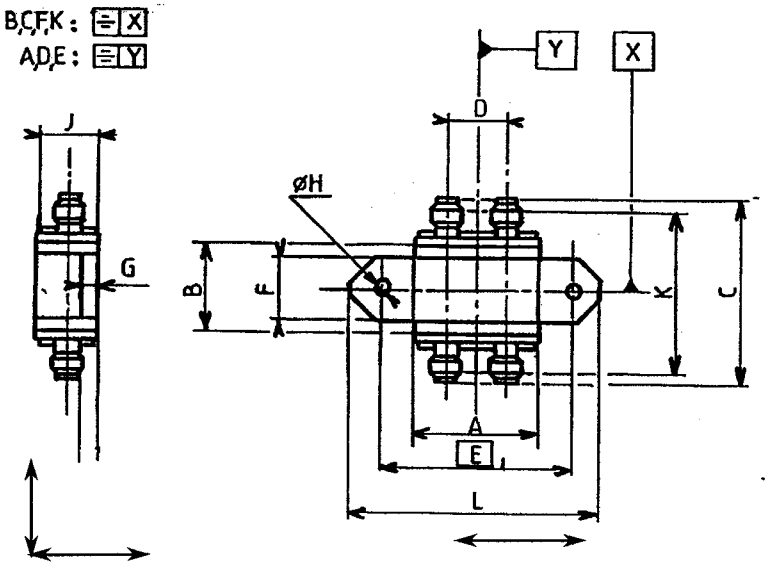


No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	29	31	dB
2	Coupling Variation	CV	-0.1	+0.1	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.15 1.15	- -
4	Insertion Loss	IL	-	0.2	dB
5	Directivity	DIR	13	-	dB
6	Frequency Range	f	2.003	2.053	GHz
7	RF Power	P	-	4	W
8	RF Leakage	E	65	-	dB
9	Weight	W	-	45	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-40	+85	°C
12	Physical Dimensions * on area without paint	A* B* C ⌀D E F G* H J K* L M N	39.5 14.5 12.5 2.79 13.9 1.9 6.7 6 9 7.7 - 12 25	40.5 15.5 13.5 2.95 14.1 2.1 7.7 7 10 8.7 17 14 27	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9.

TABLE 1(a) - TYPE VARIANT DETAILED INFORMATION

TYPE VARIANT No. 23



vibration axes

vibration axis

No	CHARACTERISTICS	SYMBOL	VALUES		UNIT
			MIN	MAX	
1	Coupling Factor	CF	3.9	4.5	dB
2	Coupling Variation	CV	-	-	dB
3	VSWR Primary Line Secondary Line	RLp RLs	- -	1.22 1.22	- -
4	Insertion Loss	IL	-	0.5	dB
5	Directivity	DIR	25	-	dB
6	Frequency Range	f	3.7	4.2	GHz
7	RF Power	P	-	12	W
8	RF Leakage	E	85	-	dB
9	Weight	W	-	45	g
10	Interfaces Input Output Coupled Output	- - -	340200231B301 340200231B301 340200231B301		- - -
11	Operating Temperature Range	Top	-10	+60	°C
12	Physical Dimensions * on area without paint	A* B* C D E F G* ⌀H J K* L M N	- 17.7 - 14.7 39.5 14.5 2.8 4.5 12.5 32.9 - - -	22 18.2 37.5 15.2 40.5 14.9 3.2 4.6 12.9 33.4 53.1 - -	mm mm mm mm mm mm mm mm mm mm mm mm mm

NOTES: See Page 9. (Note 3 does not apply)