

MIL-STD-1639A  
22 February 1980  
SUPERSEDING  
MIL-STD-1639  
6 January 1978

# **MILITARY STANDARD**

## **POWER DIVIDERS, POWER COMBINERS, AND POWER DIVIDER/COMBINERS, SELECTION OF**



**MIL-STD-1639 A**  
**22 February 1980**

**DEPARTMENT OF DEFENSE**  
**Washington, DC 20301**

**Power Dividers, Power Combiners, and Power Divider/Combiners, Selection of.**

**MIL-STD-1639**

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Electronic Systems Command, ELEX 5043, Washington, DC 20360, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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## 1. SCOPE

1.1 Scope. This standard provides standard power dividers, power combiners, and power divider/combiners considered by the Department of Defense as standard for use in military equipment and applications.

1.2 Purpose. The purpose of this standard is to:

- a. Provide the equipment designer with a list of power dividers or combiners considered standard for use in military applications.
- b. Restrict and minimize the variety of power dividers or combiners for use in military applications in order to provide effective logistic support of equipment.
- c. Establish criteria pertinent to choice and application of power dividers or combiners for use in military equipment.

## 2. REFERENCED DOCUMENT

2.1 Issues of document. The following document of the issue in effect on the date of invitation for bids or request for proposal forms a part of this standard to the extent specified herein.

### SPECIFICATION

#### MILITARY

MIL-P-23971- Power Dividers, Power Combiners, and Power Divider/Combiners, General Specification For.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

## 3. DEFINITIONS

3.1 The terms used in this standard are those commonly encountered in microwave engineering practice.

## 4. GENERAL REQUIREMENTS

4.1 Selection of power dividers or combiners. Power dividers or combiners to be used in military applications shall be selected from those listed in Table I.

4.2 Criteria for selection. The criteria for the selection of power dividers or combiners for inclusion in this standard are:

- a. The power dividers or combiners shall be considered by representatives of the military departments to be the best available type for current application.
- b. Availability of the power dividers or combiners shall be reasonably certain.
- c. The power dividers or combiners shall have an approved military specification.

4.3 Application and use. Power dividers or combiners used in military application shall be representative of manufactured lots possessing acceptable material and physical and electrical characteristics and shall in no manner degrade the operational characteristics of the equipment in which used.

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## 5. DETAILED REQUIREMENTS

5.1 The detailed requirements for power dividers or combiners listed in this standard are covered by MIL-P-23971 specification sheets.

TABLE I. Part numbers and characteristics.

Part number	Frequency range	Average coupling (dB)	VSWR max	Insertion loss max (dB)	Isolation min (dB)	Phase balance degrees	Amplitude balance (dB)	Power level (W)	
								Avg	Pk
POWER DIVIDERS, 4 PORT QUADRATURE, SOLDER TERMINALS									
M23971/1-01	225-400 MHz	3+2 -0	1.2:1	0.3	23	±1.5	±0.4	60	300
-02	250-500 MHz	3+2 -0	1.2:1	0.25	23	±1.5	±0.5	60	300
-03	225-400 MHz	3+2 -0	1.2:1	0.25	25	±1.5	±0.4	100	200
-04	225-400 MHz	3+2 -0	1.2:1	0.25	25	±1.5	±0.4	100	200
POWER DIVIDERS, 4 PORT QUADRATURE, SMA CONNECTORS 2/									
M23971/2-01	0.25-1.0 GHz	3+2 -0	1.3:1	0.5	20	±1.5	±0.75	100	5K
-02	1.0-2.0 GHz	3+2 -0	1.3:1	0.25	23	±1.5	±0.5	100	5K
-03	2.0-4.0 GHz	3+2 -0	1.3:1	0.25	20	±1.5	±0.5	100	5K
-04	4.0-8.0 GHz	3+2 -0	1.35:1	0.35	18	±1.5	±0.5	100	5K
-05	0.02-.200 GHz	3+5 -0	1.3:1	1.3	20	±5	±1.0	1	-
-06	0.5-1.0 GHz	3+2 -0	1.25:1	0.25	18	±1.5	±0.5	50	250
-07	1.0-2.0 GHz	3+2 -0	1.25:1	0.25	18	±1.5	±0.5	50	250
-08	2.0-4.0 GHz	3+2 -0	1.25:1	0.25	18	±2.0	±0.5	50	250
-09	4.0-8.0 GHz	3+2 -0	1.25:1	0.35	18	±2.0	±0.5	50	250
-10	7.0-11.0 GHz	3+5 -0	1.45:1	0.50	17	±2.0	±0.5	100	5K
-11	8.0-12.4 GHz	3+2 -0	1.30:1	0.40	15	±3.0	±0.5	50	250
-12	12.4-18.0 GHz	3+2 -0	1.35:1	0.50	15	±5.0	±0.5	50	250
POWER DIVIDERS, 4 PORT QUADRATURE, PLUG-IN TERMINALS									
M23971/3-01	225-400 MHz	3+5 -0	1.2:1	0.25	25	±1.5	0.4	100	200
POWER DIVIDERS, 3 PORT QUADRATURE, SOLDER TERMINALS									
M23971/4-01	225-400 MHz	3+2 -0	1.2:1	0.25	20	±1.5	0.4	100	200

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TABLE I. Dash numbers and characteristics - Continued.

Part number	Frequency range	Average coupling (dB)	VSWR max	Insertion loss max (dB)	Isolation min (dB)	Phase balance degrees	Amplitude balance (dB)	Power level (W)	
								Avg	Pk
POWER DIVIDERS, N-WAY, 0-DEGREES, SOLDER TERMINALS									
M23971/5-01	5-25 MHz	3 +.2 -0	1.3:1	0.3	25	±1.0	±0.1	0.5	1.0
↓ -02	0.2-200 MHz	4.8 +.5 -0	1.3:1	0.5	25	±2.0	±0.2	0.5	0.5
↓ -03	10-500 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.1	1	-
POWER DIVIDERS, N-WAY, 0-DEGREES, PLUG-IN TERMINALS									
M23971/6-01	1.0-100 MHz	3 +.5 -0	1.3:1	0.6	30	±1.0	±0.1	.5	-
↓ -02	2-32 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	.1
↓ -03	2-100 MHz	3 +.2 -0	1.2:1	0.25	40	±1.0	±0.1	-	3
↓ -04	10-100 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	.1
↓ -05	20-200 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	.1
↓ -06	100-300 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	.1
↓ -07	200-400 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	.1
↓ -08	10-100 MHz	4.8 +.3 -0	1.3:1	0.5	30	±1.0	±0.3	1	-
↓ -09	10-200 MHz	4.8 +.3 -0	1.3:1	0.5	30	±2.0	±0.2	-	3
POWER DIVIDERS, 4 PORT QUADRATURE, N CONNECTORS									
M23971/7-01	7.0-12.4 GHz	3 +.2 -0	1.35:1	0.1	15	±1.5	±0.5	100	3K
POWER DIVIDERS, QUADRATURE, FLAT PACK									
M23971/8-01	7.0-14.0 MHz	3 +.2 -0	1.2:1	0.5	25	±2.0	±0.75	5	-
M23971/8-02	40-80 MHz	3 +.2 -0	1.2:1	0.5	20	±3.0	±0.75	5	-
POWER DIVIDERS, N-WAY, 0-DEGREES, SMA CONNECTORS									
M23971/9-01	0.5-1.5 GHz	3 ±.25	1.15:1	0.05	6	±6.0	±1.0	150	2K

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TABLE I. Dash numbers and characteristics—Continued.

Part number	Frequency range	Average coupling (dB)	VSWR max	Insertion loss max (dB)	Isolation min (dB)	Phase balance degrees	Amplitude balance (dB)	Power level (W)	
								Avg	Pk
POWER DIVIDER/COMBINERS, QUADRATURE, RECTANGULAR, PC PINS									
M23971/10-02	26-34 MHz	3 +.2 -0	1.2:1	0.3	25	±1.0	±0.2	1	-
POWER DIVIDER/COMBINER, QUADRATURE, TO-5									
M23971/11-01	29-31 MHz	3 +.5 -0	1.2:1	0.2	25	±2.0	±0.6	-	.25
M23971/11-02	91.2-100.8 MHz	3 +.2 -0	1.2:1	0.2	25	±2.0	±0.6	-	.25
POWER DIVIDER/COMBINERS, QUADRATURE, STRIPLINE									
M23971/12-01	0.1-0.16 GHz	3 +.2 -0	1.2:1	0.3	25	±2.0	±0.6	200	1K
M23971/12-02	0.5-1.0 GHz	3 +.2 -0	1.2:1	0.25	20	±1.5	±0.5	200	1K
POWER DIVIDER/COMBINERS, 2-WAY, 180 DEGREES, SMA CONNECTORS									
M23971/13-01	1.0-2.0 GHz	3 +.2 -0	1.35:1	0.5	20	±6.0	±0.2	50	4K
M23971/13-02	2.0-4.0 GHz	3 +.2 -0	1.5:1	0.65	20	±6.0	±0.4	50	4K
M23971/13-03	4.0-8.0 GHz	3 +.2 -0	1.6:1	0.6	15	±8.0	±0.5	50	4K
POWER DIVIDER/COMBINERS, N-WAY, 0-DEGREES, FLAT PACK									
M23971/14-01	5.0-100 MHz	3 +.2 -0	1.3:1	0.4	30	±1.0	±0.1	-	1.0
M23971/14-02	10-500 MHz	3 +.6 -0	1.3:1	0.6	30	±1.0	±0.1	-	1.0
M23971/14-03	300-500 MHz	3 +.2 -0	1.3:1	0.5	30	±2.0	±0.1	-	1.0
M23971/14-04	3.0-32 MHz	4.8 +.3 -0	1.2:1	0.6	30	±2.0	±0.2	-	0.5
M23971/14-05	10-500 MHz	6 +.85 -0	1.5:1	0.85	25	±2.0	±2.0	-	1.0
POWER DIVIDER/COMBINERS, N-WAY, 0-DEGREES, RECTANGULAR, PC PINS									
M23971/15-01	0.1-400 MHz	3 +1.0 -0	1.2:1	1.0	15	±4.0	±0.3	-	1
-02	0.1-450 MHz	3 +1.0 -0	1.2:1	0.6	15	±4.0	±0.3	-	1
-03	2.0-32 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	1
-04	10-100 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	1

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Part number	Frequency range	Average coupling (dB)	VSWR max	Insertion loss max (dB)	Isolation min (dB)	Phase balance degrees	Amplitude balance (dB)	Power level (W)	
								Avg	Pk
POWER DIVIDER/COMBINERS, N-WAY, 0-DEGREES, RECTANGULAR, PC PINS - Continued									
M23971/15-05	20-200 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	1
-06	50-1000 MHz	3 +.2 -0	1.3:1	1.0	25	±2.0	±0.3	-	1
-07	100-300 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	1
-08	200-400 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	1
-09	140-410 MHz	4.8 +.3 -0	1.3:1	0.75	25	±3.0	±0.2	-	3
-10	0.1-200 MHz	6 +.4 -0	1.2:1	1.0	20	±2.0	±0.25	-	1
-11	0.25-250 MHz	6 +.75 -0	1.1:1	1.2	20	±2.0	±0.25	-	1
-12	10-100 MHz	6 +.4 -0	1.3:1	0.7	30	±1.0	±0.2	-	2
-13	235-275 MHz	7.78 +.6 -0	1.15:1	1.0	30	±2.0	±0.2	-	5
POWER DIVIDER/COMBINERS, N-WAY, 0-DEGREES, SMA CONNECTORS									
M23971/16-01	1.0-100 MHz	3.01 +.5 -0	1.3:1	0.5	30	±1.0	±0.2	-	2
-02	1.0-2.0 GHz	3 +.2 -0	1.25:1	0.3	20	±6.0	±0.4	-	.1
-03	1.0-2.0 GHz	3 +.2 -0	1.25:1	0.3	20	±6.0	±0.4	-	.1
-04	1.0-12.4 GHz	3 +.2 -0	1.7:1	1.3	16	±5.0	±0.2	1	-
-05	10-100 MHz	4.77 +.5 -0	1.3:1	0.5	30	±1.0	±0.2	-	5
-06	2.0-32 MHz	6 +.5 -0	1.3:1	0.7	30	±1.0	±0.2	-	2
-07	10-100 MHz	6.02 +.7 -0	1.3:1	0.7	30	±1.0	±0.2	-	2
-08	20-200 MHz	6 +.5 -0	1.3:1	0.7	30	±1.0	±0.2	-	2
-09	100-300 MHz	6 +.5 -0	1.3:1	1.0	30	±1.0	±0.2	-	2
-10	200-500 MHz	6 +.5 -0	1.3:1	1.0	30	±1.0	±0.2	-	2



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TABLE 1. Part numbers and characteristics - Continued.

Part number	Frequency range	Average coupling (dB)	VSWR max	Insertion loss max (dB)	Isolation min (dB)	Phase balance degrees	Amplitude balance (dB)	Power level (W)	
								Avg	Pk
POWER DIVIDER/COMBINERS, N-WAY, 0-DEGREES, SMA CONNECTORS - Continued									
M23971/16-11	250-500 MHz	6 +.5 -0	1.3:1	1.0	30	±1.0	±0.2	-	2
-12	1.0-2.0 GHz	6 +.5 -0	1.35:1	0.6	20	±6.0	±0.6	-	.1
-13	1.0-2.0 GHz	6 +.9 -0	1.35:1	0.6	20	±6.0	±0.6	.316	-
-14	2.0-4.0 GHz	6 +.5 -0	1.35:1	0.6	18	±3.0	±0.3	.1	-
-15	10-100 MHz	7.8 +.7 -0	1.3:1	1.0	30	±2.0	±0.2	2	-
POWER DIVIDER/COMBINERS, N-WAY, 0-DEGREES, TNC CONNECTORS									
M23971/17-01	0.05-20 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	2
M23971/17-02	1.0-100 MHz	3 +.2 -0	1.3:1	0.5	30	±1.0	±0.2	-	5
M23971/17-03	200-400 MHz	4.8 +.3 -0	1.3:1	0.75	25	±2.0	±0.2	-	5

Custodians:  
Army - ER  
Navy - EC  
Air Force - 11

Review activities:  
Army - MI, AR  
Navy - OS, SH  
Air Force - 17, 85  
DLA - ES

User activities:  
Army - AV  
Navy - AS, CG, MC  
Air Force - 19

Preparing activity:  
Navy - EC

Agent:  
DLA - ES

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