

**MIL-STD-1640B**  
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**SUPERSEDING**  
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# **MILITARY STANDARD**

## **MIXER STAGES, RADIO FREQUENCY, SELECTION OF**



**FSC 5985**

MIL-STD-1640B

DEPARTMENT OF DEFENSE  
WASHINGTON, DC 20363

Mixer Stages, Radio Frequency, Selection of

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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: Naval Electronic Systems Command, ELEX 8111, Department of the Navy, Washington, DC 20363 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 a list of mixer stages for use in military equipment applications.

1.2 Purpose of standard. The purpose of this standard is for the following:

- a. Provide new equipment designers with a list of mixer stages considered for use in military applications.
- b. Restrict the number of mixer stages for use in military applications in order to provide effective logistic support of equipment.
- c. Establish criteria pertinent to choice and application of mixer stages for use in military equipment.

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2. REFERENCED DOCUMENTS

2.1 Government specifications and standards. Unless otherwise specified, the following specifications, standards, and handbooks, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-M-28837 - Mixer Stages, Radio Frequency, General Specification For.

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

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3. DEFINITIONS

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

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4. GENERAL REQUIREMENTS :

4.1 Selection of mixer stages. Mixer stages to be used in military applications shall be selected from those listed in tables I through VIII.

4.2 Criteria for selection. The criteria for the selection of mixer stages for inclusion in this standard are as follows:

- a. The mixer stages shall be considered by representatives of the Military Departments the best available type for current application.
- b. Availability of the mixer stages shall be reasonably certain.
- c. The mixer stages shall have an approved military specification.

4.3 Application and use. Mixer stages used in military applications shall be representative of manufactured lots possessing acceptable material, and physical and electrical characteristics. They shall in no manner degrade the operational characteristics of the equipment it is used in.

4.4 Detailed requirements for mixer stages. The detailed requirements for mixer stages listed in this standard are covered by the applicable MIL-M-28837 specification sheet.

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**5. DETAILED REQUIREMENTS**

**Not applicable.**



6. NOTES

6.1 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

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TABLE I. Mixer stages with 8-pin dual inline headers.

Part number M28837/1-	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum loss (SSB) (MHz)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)				
							LO-IF	LO-IF	RF-IF	RF-IF	
							LO frequency (MHz)	dB	dB	dB	dB
01	LO .05 - 200		6.5 at $f_L$ and $f_I$ 0.2 - 50	$f_I$ DC - 50	6.5 at $f_L$ and $f_I$ 1 - 50	$f_I$ 0.4 - 50	.05 - 30	45	40	N/A	
	RF .05 - 200	+7	8.0 at $f_L$ and $f_I$ 50 - 200	$f_I$ DC - 200	8.0 at $f_L$ and $f_I$ 50 - 200	$f_I$ 0.4 - 200	30 - 200	35	30	N/A	
	IF DC - 200		8.5 at $f_L$ and $f_I$ 0.05 - 0.2	$f_I$ DC - 0.4							
02	LO 5 - 500		7.0 at $f_L$ and $f_I$ 5 - 150	$f_I$ 0.4 - 150	7.0 at $f_L$ and $f_I$ 10 - 100	$f_I$ 0.4 - 100	5 - 50	45	40	N/A	
	RF 5 - 500	+7	9.0 at $f_L$ and $f_I$ 150 - 500	$f_I$ 0.4 - 500	9.0 at $f_L$ and $f_I$ 100 - 500	$f_I$ 0.4 - 500	50 - 500	30	25	N/A	
	IF DC - 500		7.5 at $f_L$ and $f_I$ 1 - 250	$f_I$ DC - 250	N/A		0.5 - 1	35	30	N/A	
03	LO .5 - 500		8.5 at $f_L$ and $f_I$ 0.5 - 500	$f_I$ DC - 500			250 - 500	30	25	N/A	
	RF .5 - 500	+7	6.5 at $f_L$ and $f_I$ 5 - 200	$f_I$ 5 - 80	6.5 at $f_L$ and $f_I$ 5 - 80	$f_I$ 5 - 80	2 - 32	40	40	N/A	
	IF DC - 500		7.0 at $f_L$ and $f_I$ .4 - 120	$f_I$ DC - 120	7.0 at $f_L$ and $f_I$ DC - 120	$f_I$ DC - 120					
04	LO 2 - 500		7.0 at $f_L$ and $f_I$ 5 - 300	$f_I$ 5 - 300	7.0 at $f_L$ and $f_I$ 5 - 300	$f_I$ 5 - 300	32 - 100	35	35	N/A	
	RF 2 - 400	+20	8.0 at $f_L$ and $f_I$ 5 - 400	$f_I$ DC - 300	8.0 at $f_L$ and $f_I$ 5 - 400	$f_I$ 5 - 80	100 - 500	25	25	N/A	
	IF DC - 800		7.5 at $f_L$ and $f_I$ 5 - 470	$f_I$ 5 - 80	7.5 at $f_L$ and $f_I$ 5 - 470	$f_I$ 5 - 80					
05	LO .05 - 200	+13	7.5 at $f_L$ and $f_I$ 0.2 - 50	$f_I$ DC - 50	7.5 at $f_L$ and $f_I$ 1 - 50	$f_I$ 0.4 - 50	.05 - 30	45	40	N/A	
	RF .05 - 200		9.0 at $f_L$ and $f_I$ .05 - 200	$f_I$ DC - 200	9.0 at $f_L$ and $f_I$ 50 - 200	$f_I$ 0.4 - 200	30 - 200	30	25	N/A	
	IF DC - 200						.05 - 3	N/A	N/A	30	

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TABLE I. Mixer stages with 8-pin dual in-line headers - Continued.

Part number M28837/1 -	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum conversion loss (MHz)	Noise figure (SSB) (dB)	ISOLATION (SSB)				
						LO - RF dB	LO - IF dB	RF - IF dB	LO frequency (MHz)	
06	LO .5 - 500	+17	7.0 at $f_L$ and $f_R$ 0.5 - 30 $f_I$ DC - 30	7.0 at $f_L$ and $f_R$ 1 - 30 $f_I$ 0.4 - 30	55	45	N/A	0.5 - 30		
	RF .5 - 500		7.5 at $f_L$ and $f_R$ 30 - 100 $f_I$ DC - 100			45	35	N/A	30 - 100	
	IF DC - 500		9.0 at $f_L$ and $f_R$ 100 - 500 $f_I$ DC - 500			35	25	N/A	100 - 500	
07	LO 5 - 400	+17	7.5 at $f_L$ and $f_R$ 5 - 200 $f_I$ DC - 200	N/A	35	30	N/A	5 - 100		
	RF 5 - 400		9.0 at $f_L$ and $f_R$ 200 - 400 $f_I$ DC - 400			25	20	N/A	100 - 400	
	IF DC - 400		7.5 at $f_L$ and $f_R$ 0.5 - 5 $f_I$ DC - 500			45	35	N/A	0.5 - 5	
08	LO 0.5 - 500	+17	8.5 at $f_L$ and $f_R$ 5 - 500 $f_I$ DC - 500	N/A	30	30	N/A	5 - 250		
	RF 0.5 - 500		7.5 at $f_L$ and $f_R$ 2 - 375 $f_I$ DC - 375			25	20	N/A	250 - 500	
	IF DC - 500		8.5 at $f_L$ and $f_R$ 1 - 750 $f_I$ DC - 750			45	30	N/A	1 - 2	
09	LO 1 - 750	+7	7.5 at $f_L$ and $f_R$ 1 - 50 $f_I$ DC - 50	N/A	30	25	N/A	2 - 375		
	RF 1 - 750		7.5 at $f_L$ and $f_R$ 1 - 50 $f_I$ DC - 500			25	20	N/A	375 - 750	
	IF DC - 750		7.5 at $f_L$ and $f_R$ 1 - 50 $f_I$ DC - 50			45	40	N/A	0.4 - 50	
10	LO .4 - 500	+13	9.0 at $f_L$ and $f_R$ 0.4 - 500 $f_I$ DC - 500	7.5 at $f_L$ and $f_R$ 1 - 50 $f_I$ 0.4 - 50	25	25	N/A	50 - 500		
	RF .4 - 500		8.5 at $f_L$ and $f_R$ 2 - 400 $f_I$ DC - 400			50	40	25	1 - 100	
	IF DC - 500		9.5 at $f_L$ and $f_R$ 1 - 500 $f_I$ DC - 500			40	30	20	100 - 200	
11	LO 1 - 500	+23	6.0 at $f_L$ and $f_R$ .01 - 5 $f_I$ 0.4 - 5	Within 1 dB of conversion loss	45	40	N/A	.002 - 5		
	RF 1 - 500		8.0 at $f_L$ and $f_R$ .002 - 12 $f_I$ 0.4 - 12			40	30	N/A	5 - 12	
	IF DC - 500		7.5 at $f_L$ and $f_R$ 1 - 50 $f_I$ DC - 500			40	30	N/A	5 - 12	
12	LO .002 - 12	+7	8.0 at $f_L$ and $f_R$ .002 - 12 $f_I$ 0.4 - 12	8.0 at $f_L$ and $f_R$ 5 - 12 $f_I$ 0.4 - 12	40	30	N/A	5 - 12		
	RF .002 - 12									
	IF DC - 12									

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TABLE I. Mixer stages with 8-pin dual inline headers - Continued.

Part number, M28837/1-	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (dB)	Maximum loss (SSB) (MHz)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)									
							LO-IF dB	LO-IF dB	RF-IF dB	LO Frequency (MHz)						
13	LO .05 - 200	0	6.5 at $f_L$ and $f_R$ 0.2 - 50 $f_I$ DC - 50	6.5 at $f_L$ and $f_R$ 0.2 - 50 $f_I$ 0.4 - 50	6.5 at $f_L$ and $f_R$ 0.2 - 50 $f_I$ 0.4 - 50	45	40	N/A	.05 - 30							
	RF .05 - 200		8.0 at $f_L$ and $f_R$ 50 - 200 $f_I$ DC - 200									8.0 at $f_L$ and $f_R$ 50 - 200 $f_I$ 0.4 - 200	35	30	N/A	30 - 200
	IF DC - 200		8.5 at $f_L$ and $f_R$ 0.05 - 0.2 $f_I$ DC - 0.2													
14	LO 5 - 500	0	7.0 at $f_L$ and $f_R$ 10 - 100 $f_I$ 10 - 100	7.0 at $f_L$ and $f_R$ 10 - 100 $f_I$ 10 - 100	7.0 at $f_L$ and $f_R$ 10 - 100 $f_I$ 10 - 100	45	40	N/A	5 - 50							
	RF 5 - 500		8.0 at $f_L$ and $f_R$ 100 - 200 $f_I$ 10 - 200									9.0 at $f_L$ and $f_R$ 100 - 200 $f_I$ 10 - 200	30	25	N/A	50 - 500
	IF DC - 500		9.5 at $f_L$ and $f_R$ 5 - 500 $f_I$ .5 - 500									9.5 at $f_L$ and $f_R$ 5 - 500 $f_I$ .5 - 500				
15	LO 1 - 500	+7	7.0 at $f_L$ and $f_R$ 1 - 400 $f_I$ DC - 400	7.0 at $f_L$ and $f_R$ 1 - 400 $f_I$ DC - 400	Within 1 dB of conversion loss	40	35	N/A	1 - 100							
	RF 1 - 500		8.0 at $f_L$ and $f_R$ 1 - 500 $f_I$ DC - 500										30	25	N/A	100 - 500
	IF DC - 500		7.0 at $f_L$ and $f_R$ 1 - 400 $f_I$ DC - 400									7.0 at $f_L$ and $f_R$ 1 - 400 $f_I$ DC - 400				
16	LO 1 - 500	+15	7.0 at $f_L$ and $f_R$ 1 - 400 $f_I$ DC - 400	7.0 at $f_L$ and $f_R$ 1 - 400 $f_I$ DC - 400	Within 1 dB of conversion loss	40	40	N/A	1 - 100							
	RF 1 - 500		8.0 at $f_L$ and $f_R$ 400 - 500 $f_I$ DC - 500										30	25	N/A	100 - 500
	IF DC - 500															

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TABLE II. Mixer stages with solder leads, flat-pack configuration.

Part number M28837/2-	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum conversion loss (MHz)	Noise figure (SSB) (dB)	ISOLATION (SSB)					
						LO-IF dB	LO-IF dB	RF-IF dB	LO frequency (MHz)		
01	RF 5 - 1,000	+10	8 at $f_L$ and $f_R$ 5 - 1,000 $f_I$ DC - 1,000	(MHz)	Within 1 dB of conversion loss	40	40	30	5 - 100		
	LO 5 - 1,000					30	25	15	100 - 1,000		
	IF DC - 1,000										
02	RF 10 - 1,500	+7	7.0 at $f_R$ 20 - 600 $f_L$ 10 - 800 $f_I$ DC - 200	(MHz)	7.0 at $f_R$ 20 - 600 $f_L$ 10 - 800 $f_I$ 0.4 - 200	30	30	N/A	10 - 600		
	LO 10 - 1,500					25	20	N/A	600 - 1,200		
	IF DC - 1,000										
03	RF 600 - 2,000	+7	9.0 at $f_L$ and $f_R$ 600 - 1,000 $f_I$ DC - 1,000	(MHz)	Within 1 dB of conversion loss	25	23	25	600 - 1,000		
	LO 600 - 2,000					20	12	15	11,000 - 2,000		
	IF DC - 1,000										
04	RF .5 - 500	+7	7.0 at $f_L$ and $f_R$ 1 - 300 $f_I$ DC - 300	(MHz)	Within 1 dB of conversion loss	40	30	23	10.5 - 300		
	LO .5 - 500					35	20	20	10.5 - 500		
	IF DC - 500										
05	RF .5 - 500	+7	7.0 at RF port to $IF_2$ .5 - 500 $f_I$ DC - 500	(MHz)	Within 1 dB of conversion loss	35	30	25	10.5 - 10		
	LO .5 - 500					30	25	20	10 - 200		
	$IF_1$ DC - 500 $IF_2$ DC - 500					25	20	15	200 - 500		
06	RF .5 - 400	+17	6.5 at $f_L$ and $f_R$ 1 - 100 $f_I$ DC - 100	(MHz)	6.5 at $f_L$ and $f_R$ 1 - 100 $f_I$ DC - 100	45	30	20	1 - 100		
	LO .5 - 600					35	25	10	1.5 - 400		
	IF DC - 400										

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TABLE II. Mixer stages with solder leads, flat-pack configuration - Continued.

Part number M28837/2-	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB)		Noise figure (SSB) (dB)	ISOLATION (SSB)		
			(dB)	(MHz)		LO - RF - minimum (dB)	LO frequency (MHz)	
07	RF 500 - 1,000	+7	7.5 at $f_L$ and $f_R$ 5 - 500 $f_I$ DC - 500	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	35					30	25	15 - 50
	30					25	20	150 - 500
08	LO 500 - 1,000	0	8.0 at $f_L$ and $f_R$ 500 - 1,000 $f_I$ DC - 1,000	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	35					27	21	500 - 1,000
	27					24	17	1,000 - 2,000
09	RF 1 - 3,500	+10	7.0 at $f_L$ and $f_R$ 5 - 1,000 $f_I$ DC - 1,000	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	30					30	30	5 - 1,000
	20					20	18	11 - 3,500
10	RF 800 - 2,400	+7	8.0 at $f_R$ 1,000 - 2,000 $f_L$ 800 - 3,500 $f_I$ 10 - 1,500	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	25					18	20	800 - 2,000
	20					20	20	12,000 - 3,500
11	LO 800 - 3,500	+9	8.5 at $f_R$ 800 - 2,400 $f_L$ 800 - 3,500 $f_I$ 10 - 1,500	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	30					30	30	2.5 - 7 GHz
	17					17	17	2.5 - 3.5 GHz
12	RF 2.5 - 5.5 GHz	+10	7.0 at $f_L$ 2.5 - 7 GHz $f_R$ 2.5 - 5.5 GHz $f_I$ 0.03 - 1.5 GHz	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	25					25	20	2.5 - 9 GHz
	20					20	15	9 - 11.5 GHz
12	LO 2.5 - 7.0 GHz	+10	7.0 at $f_L$ 2.5 - 7 GHz $f_R$ 2.5 - 5.5 GHz $f_I$ 0.03 - 1.5 GHz	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	25					25	20	2.5 - 9 GHz
	20					20	15	9 - 11.5 GHz
12	IF DC - 1.5 GHz	+10	8.0 at $f_R$ 4.5 - 9.5 GHz $f_L$ 2.5 - 11 GHz $f_I$ 0.03 - 2 GHz	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	25					25	20	2.5 - 9 GHz
	20					20	15	9 - 11.5 GHz
12	IF DC - 2.0 GHz	+10	8.0 at $f_L$ 4.5 - 9.5 GHz $f_R$ 2.5 - 11 GHz $f_I$ 0.03 - 2 GHz	Within 1 dB of conversion loss		LO - RF - minimum	LO frequency	
	25					25	20	2.5 - 9 GHz
	20					20	15	9 - 11.5 GHz

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TABLE II. Mixer stages with solder leads, flat-pack configuration - Continued.

Part number M28837/2-	Frequency range (GHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum conversion loss (SSB) (GHz)	Noise figure (SSB) (dB)	ISOLATION (SSB)	
							LO - RF - IF - DB
13	RF 7 - 18	+10	8.0 at fr 8 - 16 fl 5 - 18 fi 0.03 - 3	8.0 at fr 8 - 16 fl 5 - 18 fi 0.03 - 3	8.0 at fr 8 - 16 fl 5 - 18 fi 0.03 - 3	22	
	LO 5 - 18					15	5 - 14
	IF DC - 3					22	14 - 18
14	RF 1 - 18	+13	8.0 at fr 8 - 16 fl 5 - 16 fi 0.03 - 3	8.5 at fr 8 - 16 fl 5 - 16 fi 0.03 - 3	8.5 at fr 8 - 16 fl 5 - 16 fi 0.03 - 3	23	
	LO 2 - 18					15	0.03 - 8
	IF DC - 5					22	8 - 18
15	RF 1 - 18	+13	8.0 at fr 5 - 13 fl 5 - 13 fi 0.03 - 2	8.0 at fr 5 - 13 fl 5 - 13 fi 0.03 - 2	8.0 at fr 5 - 13 fl 5 - 13 fi 0.03 - 2	18	
	LO 2 - 18					20	2 - 18
	IF DC - 5					25	1 - 2
16	RF 2 - 18	+10	9.0 at fr 2 - 16 fl 2 - 18 fi 0.03 - 4	9.0 at fr 2 - 16 fl 2 - 18 fi 0.03 - 4	9.0 at fr 2 - 16 fl 2 - 18 fi 0.03 - 4	28	
	LO 2 - 18					20	2 - 18
	IF 1 - 8					25	1 - 8
17	RF 2 - 18	+13	10.0 at fr 2 - 10 fl 2 - 18 fi 1 - 18	10.0 at fr 2 - 10 fl 2 - 18 fi 1 - 18	10.0 at fr 2 - 10 fl 2 - 18 fi DC - 5	15	
	LO 2 - 18					16	2 - 18
	IF 1 - 8					20	2 - 18
18	RF 2 - 18	+10	10.5 at fr 10 - 18 fl 10 - 18 fi 2 - 8	10.5 at fr 10 - 18 fl 10 - 18 fi 2 - 8	10.5 at fr 10 - 18 fl 10 - 18 fi 2 - 8	15	
	LO 2 - 18					16	2 - 18
	IF 1 - 8					20	2 - 18
19	RF 2 - 18	+10	11.0 at fr 10 - 18 fl 2 - 10 fi 1 - 8	11.0 at fr 10 - 18 fl 2 - 10 fi 1 - 8	11.0 at fr 10 - 18 fl 2 - 10 fi 1 - 8	15	
	LO 2 - 18					16	2 - 18
	IF DC - 4.0					20	2 - 18

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TABLE III. Mixer stages with SMA connectors (female).

Part number	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Noise figure (SSB) (dB)	ISOLATION (SSB)
M28837/3-01	RF 8,000 - 12,400 LO 8,000 - 12,400 IF DC - 1,000	+7	f <sub>L</sub> and f <sub>R</sub> 8,000 - 12,400 f <sub>I</sub> DC - 200 10.5 at f <sub>I</sub> 200 - 1,000	f <sub>L</sub> and f <sub>R</sub> 8,000 - 12,400 7.5 at f <sub>I</sub> DC - 200 11.5 at f <sub>I</sub> 200 - 1,000	-6 N/A N/A 18,000 - 12,400
M28837/5-01	RF 300 - 1,000 LO 300 - 1,000 IF DC - 1,000	+7	8.0 at f <sub>L</sub> and f <sub>R</sub> 300 - 1,000 f <sub>I</sub> DC - 200 9.0 at f <sub>I</sub> 200 - 1,000	8.0 at f <sub>L</sub> and f <sub>R</sub> 300 - 1,000 f <sub>I</sub> 10 - 200 9.0 at f <sub>I</sub> 200 - 1,000	40 25 20 300 - 1,000
M28837/5-02	RF 1,000 - 4,200 LO 1,000 - 4,200 IF DC - 1,000	+7	8.5 at f <sub>L</sub> and f <sub>R</sub> 1,000 - 1,500 f <sub>I</sub> DC - 1,000 7.5 at f <sub>L</sub> and f <sub>R</sub> 1,500 - 4,200 f <sub>I</sub> DC - 1,000	8.5 at f <sub>L</sub> and f <sub>R</sub> 1,000 - 1,500 f <sub>I</sub> 30 - 1,000 7.5 at f <sub>L</sub> and f <sub>R</sub> 1,500 - 4,200 f <sub>I</sub> 30 - 1,000	25 15 N/A 11,000 - 4,200
M28837/5-03	RF 0.2 - 500 LO 0.2 - 500 IF DC - 500	+7	6.5 at f <sub>L</sub> , f <sub>R</sub> and f <sub>I</sub> 1 - 50 8.5 at f <sub>L</sub> , f <sub>R</sub> and f <sub>I</sub> 2 - 500	6.5 at f <sub>L</sub> , f <sub>R</sub> and f <sub>I</sub> 1 - 50 8.5 at f <sub>L</sub> , f <sub>R</sub> and f <sub>I</sub> 1 - 500	45 40 35 12 - 50
M28837/5-04	RF 1,000 - 4,000 LO 1,000 - 4,000 IF DC - 1,000	+20	8.0 at f <sub>L</sub> 1,200 - 4,000 f <sub>R</sub> 1,200 - 3,500 f <sub>I</sub> DC - 500 9.5 at f <sub>L</sub> and f <sub>R</sub> 1,000 - 4,000 f <sub>I</sub> DC - 1,000	8.0 at f <sub>L</sub> 1,200 - 4,000 f <sub>R</sub> 1,200 - 3,500 f <sub>I</sub> DC - 500 9.5 at f <sub>L</sub> and f <sub>R</sub> 1,000 - 4,000 f <sub>I</sub> DC - 1,000	20 10 15 N/A 11,000 - 4,000 1,000 - 2,000 2,000 - 4,000
M28837/5-05	RF 2,500 - 5,500 LO 2,500 - 7,000 IF DC - 1,500	+9	6.5 at f <sub>L</sub> 3,000 - 5,500 f <sub>R</sub> 3,000 - 5,000 f <sub>I</sub> 30 - 500 7.0 at f <sub>L</sub> 2,500 - 7,000 f <sub>R</sub> 2,500 - 5,500 f <sub>I</sub> 30 - 1,500	6.5 at f <sub>L</sub> 3,000 - 5,500 f <sub>R</sub> 3,000 - 5,000 f <sub>I</sub> 30 - 500 7.0 at f <sub>L</sub> 2,500 - 7,000 f <sub>R</sub> 2,500 - 5,500 f <sub>I</sub> 30 - 1,500	30 17 20 2,500 - 7,000 2,500 - 3,500 3,500 - 7,000
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	7.0 at f <sub>L</sub> 4,000 - 10,000 f <sub>R</sub> 5,000 - 9,000 f <sub>I</sub> 30 - 1,000 8.0 at f <sub>L</sub> 2,500 - 11,000 f <sub>R</sub> 4,500 - 9,500 f <sub>I</sub> 30 - 2,000	7.0 at f <sub>L</sub> 4,000 - 10,000 f <sub>R</sub> 5,000 - 9,000 f <sub>I</sub> 30 - 1,000 8.0 at f <sub>L</sub> 2,500 - 11,000 f <sub>R</sub> 4,500 - 9,500 f <sub>I</sub> 30 - 2,000	25 20 15 10 15 18 4,500 - 9,000 9,000 - 11,500 4,000 - 11,500 2,500 - 4,000 4,500 - 8,000 8,000 - 9,500



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TABLE III. Mixer stages with SMA connectors (female) - Continued.

Part number	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum loss (MHz)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)						
							LO-RF	LO-IF	LO-IF	LO-IF	LO-IF	LO-IF	
M28837/5-07	RF 7,000 - 18,000 LO 5,000 - 18,000 IF DC - 3,000	+10	8.0 at f <sub>L</sub> 5,000 - 18,000 f <sub>R</sub> 7,000 - 16,000 f <sub>I</sub> 30 - 3,000	8.0 at f <sub>L</sub> 5,000 - 18,000 f <sub>R</sub> 7,000 - 16,000 f <sub>I</sub> 30 - 3,000	22	5,000 - 14,000	LO-RF	LO-IF	LO-IF	LO-IF	LO-IF	LO-IF	
							22	15	12	22	23	15	
							18	20	25	28	15	16	20
M28837/5-08	RF 1,000 - 18,000 LO 2,000 - 18,000 IF DC - 5,000	+13	8.0 at f <sub>L</sub> 5,000 - 13,000 f <sub>R</sub> 5,000 - 13,000 f <sub>I</sub> 30 - 2,000	8.0 at f <sub>L</sub> 5,000 - 13,000 f <sub>R</sub> 5,000 - 13,000 f <sub>I</sub> 30 - 2,000	18	2,000 - 18,000	LO-RF	LO-IF	LO-IF	LO-IF	LO-IF	LO-IF	
							18	20	25	28	15	16	20
							18	20	25	28	15	16	20
M28837/5-09	RF 2,000 - 18,000 LO 2,000 - 18,000 IF DC 1,000 - 8,000	+13	9.0 at f <sub>L</sub> 2,000 - 18,000 f <sub>R</sub> 2,000 - 16,000 f <sub>I</sub> 30 - 4,000	9.0 at f <sub>L</sub> 2,000 - 18,000 f <sub>R</sub> 2,000 - 16,000 f <sub>I</sub> 30 - 4,000	9.0	2,000 - 8,000	LO-RF	LO-IF	LO-IF	LO-IF	LO-IF	LO-IF	
							9.0	10.0	10.0	10.0	10.0	10.0	10.0
							10.0	10.0	10.0	10.0	10.0	10.0	10.0
M28837/5-10	RF 2,000 - 18,000 LO 2,000 - 18,000 IF DC - 4,000	+10	10.0 at f <sub>L</sub> 2,000 - 14,000 f <sub>R</sub> 2,000 - 10,000 f <sub>I</sub> 30 - 4,000	10.0 at f <sub>L</sub> 2,000 - 14,000 f <sub>R</sub> 2,000 - 10,000 f <sub>I</sub> 30 - 4,000	15	2,000 - 18,000	LO-RF	LO-IF	LO-IF	LO-IF	LO-IF	LO-IF	
							15	16	20	15	16	20	15
							15	16	20	15	16	20	15

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TABLE IV. Mixer stages with Series N and BNC connectors (female).

Part number	Frequency range	IF frequency	Input power
M28837/4-01	$\frac{\text{GHz}}{4-8}$	$\frac{\text{MHz}}{30}$	$\frac{\text{mW}}{1-2}$

TABLE V. Mixer stages with BNC connectors (female).

Part number	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)			
						LO- RF- minimum	LO- RF- minimum	LO- RF- minimum	LO- RF- minimum
M28837/6-01	LO 3.0 - 1,000	+7	7.5 at $f_L$ and $f_R$ 10 - 100 $f_I$ DC - 100	7.5 at $f_L$ and $f_R$ 10 - 100 $f_I$ 0.4 - 100	(MHz)	LO- RF-	LO- RF-	LO- RF-	LO- RF-
	dB					dB	dB	dB	
	RF 3.0 - 1,000					40	N/A	3 - 100	
	IF DC - 1,000		10 at $f_L$ and $f_R$ 3 - 1,000 $f_I$ DC - 1,000	10 at $f_L$ and $f_R$ 3 - 1,000 $f_I$ 0.4 - 1,000		30	20	N/A	100 - 1,000

TABLE VI. Mixer stages with T0-5 configuration.

Part number	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)			
						LO- RF- minimum	LO- RF- minimum	LO- RF- minimum	LO- RF- minimum
M28837/7-01	RF 10 - 500	+7	7.0 at $f_L$ and $f_R$ 10 - 200 $f_I$ DC - 200	7.0 at $f_L$ and $f_R$ 10 - 200 $f_I$ 0.4 - 200	(MHz)	LO- RF-	LO- RF-	LO- RF-	LO- RF-
	dB					dB	dB	dB	
	40					35	25	10 - 50	
	LO 10 - 500					30	30	20	50 - 100
	IF DC - 500		8.0 at $f_L$ and $f_R$ 200 - 350 $f_I$ DC - 350	8.0 at $f_L$ and $f_R$ 200 - 350 $f_I$ 0.4 - 350		30	25	15	100 - 200
			9.0 at $f_L$ and $f_R$ 350 - 500 $f_I$ DC - 500	9.0 at $f_L$ and $f_R$ 350 - 500 $f_I$ 0.4 - 500		25	15	10	200 - 500
M28837/7-03	RF 0.4 - 500	+7	6.5 at $f_L$ and $f_R$ 1 - 200 $f_I$ DC - 200	6.5 at $f_L$ and $f_R$ 2 - 200 $f_I$ 2 - 200	(MHz)	LO- RF-	LO- RF-	LO- RF-	LO- RF-
	dB					dB	dB	dB	
	LO 0.4 - 500					45	30	N/A	0.4 - 60
	IF DC - 500		7.5 at $f_L$ and $f_R$ 0.4 - 500 $f_I$ DC - 500	7.5 at $f_L$ and $f_R$ 2 - 500 $f_I$ 2 - 500		30	20	N/A	60 - 500

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TABLE VII. Mixer stages with DC mount configurations.

Part number	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum conversion loss (SSB) (MHz)	Noise figure (SSB) (dB)	ISOLATION (SSB)			
						LO-IF	LO-IF	RF-IF	RF-LO
						dB	dB	dB	dB
M28837/8-01	RF DC - 800	+7	6.5 at $f_L$ and $f_R$ 5 - 500 $f_I$ DC - 500	6.5 at $f_L$ and $f_R$ 5 - 500 $f_I$ 0.4 - 500	Noise figure (SSB) (MHz)	40	40	N/A	5 - 50
	LO 5 - 800					30	30	N/A	50 - 100
	IF DC - 800		7.0 at $f_L$ and $f_R$ 500 - 800 $f_I$ DC - 800	7.0 at $f_L$ and $f_R$ 500 - 800 $f_I$ 0.4 - 800		20	20	N/A	100 - 800

TABLE VIII. Mixer stages with TO configurations.

Part number	Frequency range (MHz)	LO power input (dBm)	Maximum conversion loss (SSB) (dB)	Maximum conversion loss (SSB) (MHz)	Noise figure (SSB) (dB)	ISOLATION (SSB)			
						LO-IF	LO-IF	RF-IF	RF-LO
						dB	dB	dB	dB
M28837/9-01	RF 10 - 1,000	0	8.5 at $f_L$ and $f_R$ 10 - 1,000 $f_I$ DC - 1,200	Within 1 dB of conversion loss	Noise figure (SSB) (MHz)	40	35	30	10 - 50
	LO 10 - 1,000					20	25	15	50 - 750
	IF DC - 1,200					15	17	10	750 - 1,000
M28837/9-02	RF 10 - 1,000	+20	7.5 at $f_L$ and $f_R$ 10 - 300 $f_I$ 10 - 200	7.5 at $f_L$ and $f_R$ 10 - 300 $f_I$ 10 - 200	Noise figure (SSB) (MHz)	35	35		10 - 100
	LO 10 - 1,000					25	25		100 - 400
	IF DC - 600					18	18	12	400 - 1,000
M28837/9-03	RF 10 - 1,500	+7	7.2 at $f_R$ 200 - 600 $f_L$ 10 - 800 $f_I$ 1 - 200	7.2 at $f_R$ 20 - 600 $f_L$ 10 - 800 $f_I$ 1 - 200	Noise figure (SSB) (MHz)	35	30		10 - 500
	LO 10 - 1,500					28	20		500 - 1,200
	IF DC - 800					25	18		1,200 - 1,500
M28837/9-04	RF 10 - 1,600	+13	7.5 at $f_L$ 10 - 800 $f_R$ 20 - 600 $f_I$ 0.4 - 200	7.5 at $f_L$ 10 - 800 $f_R$ 20 - 600 $f_I$ 0.4 - 200	Noise figure (SSB) (MHz)	35	28		10 - 500
	LO 10 - 1,600					28	20		500 - 1,000
	IF DC - 800					25	15		1,000 - 1,600

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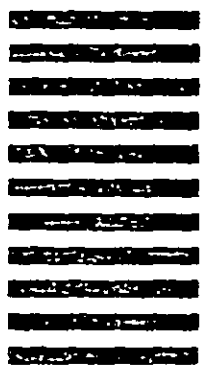
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