

MIL-STD-1640B
7 February 1985
SUPERSEDING
MIL-STD-1640A
1 JUNE 1979

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.

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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)	Maxim conversion loss (SSB) (MHz)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)			
							minimum	LO - RF	LO - IF	LO - frequency (MHz)
01	LO .05 - 200		6.5 at f_L and f_R 0.2 - 50 f_I DC - 50		6.5 at f_L and f_R 1 - 50 f_I 0.4 - 50		45	40	N/A	.05 - 30
	RF .05 - 200	+7								
	IF DC - 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
02	LO 5 - 500		8.5 at f_L and f_R 0.05 - 0.2 f_I DC - 0.4							
	RF 5 - 500	+7	7.0 at f_L and f_R 5 - 150 f_I 0.4 - 150		7.0 at f_L and f_R 10 - 100 f_I 0.4 - 100		45	40	N/A	5 - 50
	IF DC - 500		9.0 at f_L and f_R 150 - 500 f_I 0.4 - 500		9.0 at f_L and f_R 100 - 500 f_I 0.4 - 500		30	25	N/A	50 - 500
03	LO .5 - 500		7.5 at f_L and f_R 1 - 250 f_I DC - 250		N/A		35	30	N/A	0.5 - 1
	RF .5 - 500	+7					30	25	N/A	1 - 250
	IF DC - 500		8.5 at f_L and f_R 0.5 - 500 f_I DC - 500				25	20	N/A	250 - 500
04	LO 2 - 500		f_L 5 - 200 f_R 20 - 80 6.5 at f_I 5 - 80 7.0 at f_I .4 - 120		f_L 5 - 200 f_R 20 - 80 6.5 at f_I 5 - 80 7.0 at f_I DC - 120		40	40	N/A	2 - 32
	RF 2 - 400	+20	f_L 5 - 300 f_R 5 - 300 7.0 at f_I 5 - 80 8.0 at f_I DC - 300		f_L 5 - 300 f_R 5 - 300 7.0 at f_I 5 - 80 8.0 at f_I 2 - 120		35	35	N/A	32 - 100
	IF DC - 800		f_L 5 - 470 f_R 5 - 400 7.5 at f_I 5 - 80		f_L 5 - 470 f_R 5 - 400 8.0 at f_I 5 - 80		25	25	N/A	100 - 500
05	LO .05 - 200		f_L 2 - 500 f_R 2 - 400 9.0 at f_I DC - 800		f_L 2 - 500 f_R 2 - 400 9.5 at f_I 2 - 800		N/A	N/A	20	2 - 400
	RF .05 - 200	+13	7.5 at f_L and f_R 0.2 - 50 f_I DC - 50		7.5 at f_L and f_R 1 - 50 f_I 0.4 - 50		45	40	N/A	.05 - 30
	IF DC - 200		9.0 at f_L and f_R .05 - 200 f_I DC - 200		9.0 at f_L and f_R 50 - 200 f_I 0.4 - 200		30	25	N/A	30 - 200
							N/A	N/A	30	.05 - 3

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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 (SSB)		Noise figure (SSB) (dB)	ISOLATION (SSB)			
			(dB)	(MHz)		LO - RF minimum	LO - IF	RF - IF	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	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	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 - 750 f_I DC - 750	N/A	N/A	30	25	N/A	2 - 375
	RF 1 - 750		7.5 at f_L and f_R 1 - 50 f_I 0.4 - 50			25	20	N/A	375 - 750
	IF DC - 750		9.0 at f_L and f_R 0.4 - 500 f_I 0.4 - 500			45	40	N/A	0.4 - 50
10	LO .4 - 500	+13	7.5 at f_L and f_R 1 - 50 f_I 0.4 - 50	7.5 at f_L and f_R 1 - 50 f_I 0.4 - 50		45	40	N/A	0.4 - 50
	RF .4 - 500		9.0 at f_L and f_R 0.4 - 500 f_I 0.4 - 500			25	25	N/A	50 - 500
	IF DC - 500		8.5 at f_L and f_R 2 - 400 f_I DC - 400			50	40	25	1 - 100
11	LO 1 - 500	+23	9.5 at f_L and f_R 1 - 500 f_I DC - 500	Within 1 dB of conversion loss		40	30	20	100 - 200
	RF 1 - 500		6.0 at f_L and f_R .01 - 5 f_I 0.4 - 5			30	20	20	200 - 300
	IF DC - 500		8.0 at f_L and f_R .002 - 12 f_I 0.4 - 12			20	20	20	300 - 500
12	LO .002 - 12	+7	6.0 at f_L and f_R .01 - 5 f_I 0.4 - 5	6.0 at f_L and f_R .01 - 5 f_I 0.4 - 5		45	40	N/A	.002 - 5
	RF .002 - 12		8.0 at f_L and f_R .002 - 12 f_I 0.4 - 12			40	30	N/A	5 - 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)	Noise figure (SSB) (dB)	Noise figure (SSB) (MHz)	ISOLATION (SSB)			
						LO- RF- 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		45	40	N/A	.05 - 30
	RF .05 - 200		8.0 at f_L and f_R 50 - 200 f_I DC - 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		45	40	N/A	5 - 50
	RF 5 - 500		8.0 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						
15	LO 1 - 500	+7	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								
16	LO 1 - 500	+15	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 (dB)	Maximum conversion loss (SSB) (MHz)	Noise figure (SSB) (dB)	ISOLATION (SSB)												
						minimum												
						LO-IF dB	LO-IF dB	RF-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		Within 1 dB of conversion loss	40	40	30	5	100								
	30					25	15	100	1,000									
02	RF 10 - 1,500	+7	7.0 at f_R 20 - 600 f_L 10 - 800 f_I DC - 200		7.0 at f_R 20 - 600 f_L 10 - 800 f_I 0.4 - 200	30	30	N/A	10	600								
	25					20	N/A	600	1,200									
	LO 10 - 1,500					8.0 at f_R 10 - 1,200 f_L 10 - 1,400 f_I DC - 200	8.0 at f_R 10 - 1,200 f_L 10 - 1,400 f_I 0.4 - 200			25	18	N/A	1,200	1,500				
	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		Within 1 dB of conversion loss	25	23	25	600	1,000								
	LO 600 - 2,000		7.5 at f_L and f_R 1,000 - 2,000 f_I DC - 1,000			20	12	15	1,000	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		Within 1 dB of conversion loss	40	30	23	0.5	300								
	LO .5 - 500		8.0 at f_L and f_R 0.5 - 500 f_I DC - 500			35	20	20	0.5	500								
	IF DC - 500																	
05	RF .5 - 500	+7	7.0 at RF port to IF ₂ .5 - 500		Within 1 dB of conversion loss	35	30	25	0.5	10								
	LO .5 - 500		7.0 at LO port to IF ₁ .5 - 500			30	25	20	10	200	500							
	IF ₁ DC - 500 IF ₂ DC - 500																	
06	RF .5 - 400	+17	6.5 at f_L and f_R 1 - 100 f_I DC - 100		6.5 at f_L and f_R 1 - 100 f_I DC - 100	45	30	20	1	100								
	LO .5 - 600		8.0 at f_L and $f_R .5 - 400f_I DC - 400$			35	25	10	.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		Noise figure (SSB) (dB)	ISOLATION (SSB)					
			(dB)	(SSB)		LO- dB	LO- IF dB	RF- IF dB	RF- LO 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	35	30	25	15	50	
	LO 500 - 1,000					30	25	20	150	500	
	IF DC - 1,000					25	20	15	1500	1,000	
08	RF 750 - 2,000	0	7.0 at f_L and f_R 500 - 1,000 f_I DC - 1,000		Within 1 dB of conversion loss	35	27	21	500	1,000	
	LO 500 - 2,000										
	IF DC - 1,200					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	30	30	30	15	1,000	
	LO 1 - 3,500										
	IF 5 - 2,500					20	20	18	1	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		8.0 at f_R 1,000 - 2,000 f_L 800 - 3,500 f_I 10 - 1,500	25	18	20	1800	2,000	
	LO 800 - 3,500										
	IF DC - 1,500					20	20	20	12,000	3,500	
11	RF 2.5 - 5.5 GHz	+9	6.5 at f_L 3 - 5.5 GHz f_R 3 - 5.0 GHz f_I 0.03 - 0.5 GHz		6.5 at f_L 3 - 5.5 GHz f_R 3 - 5.0 GHz f_I 0.03 - 0.5 GHz	30			2.5	7 GHz	
	LO 2.5 - 7.0 GHz						17		2.5	3.5 GHz	
	IF DC - 1.5 GHz							20	3.5	7 GHz	
12	RF 4.5 - 9.5 GHz	+10	7.0 at f_R 5 - 9 GHz f_L 4 - 10 GHz f_I 0.03 - 1 GHz		7.0 at f_R 5 - 9 GHz f_L 4 - 10 GHz f_I 0.03 - 1 GHz	25			12.5	9 GHz	
	LO 2.5 - 11.5 GHz					20			9	11.5 GHz	
	IF DC - 2.0 GHz						15		4	11.5 GHz	
							10		12.5	4 GHz	
								15	14.5	8.0 GHz	
								18	8	9.5 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)		Noise figure (SSB)	ISOLATION (SSB)					
			(dB)	(GHz)		minimum				LO frequency (GHz)	
						LO- RF dB	LO- IF dB	RF- IF dB			
13	RF 7 - 18	+10	8.0 at f_R 8 - 16	8.0 at f_R 8 - 16	f_L 5 - 18 f_I 0.03 - 3	22					5 - 14
	LO 5 - 18		f_L 5 - 18			15				14 - 18	
	IF DC - 3		f_I 0.03 - 3				12		5 - 8		
						22		8 - 18			
14	RF 1 - 18	+13	8.0 at f_R 8 - 16	8.5 at f_R 8 - 16	f_L 5 - 16 f_I 0.03 - 3				23	0.03 - 8	
	LO 2 - 18		f_L 5 - 16				15	8 - 18			
	IF DC - 5		f_I 0.03 - 3								
15	RF 2 - 18	+13	8.0 at f_R 5 - 13	8.0 at f_R 5 - 13	f_L 5 - 13 f_I 0.03 - 2	18	20			2 - 18	
	LO 2 - 18		f_L 5 - 13				25	1 - 2			
	IF DC - 5		f_I 0.03 - 2				28	2 - 8			
16	RF 2 - 18	+10	9.0 at f_R 2 - 16	9.0 at f_R 2 - 16	f_L 2 - 18 f_I 0.03 - 4						
	LO 2 - 18		f_L 2 - 18								
	IF 1 - 8		f_I 0.03 - 4								
17	RF 2 - 18	+13	10.0 at f_R 1 - 18	10.0 at f_R 1 - 18	f_L 2 - 18 f_I DC - 5						
	LO 2 - 18		f_L 2 - 18								
	IF 1 - 8		f_I DC - 5								
18	RF 2 - 18	+13	10.0 at f_R 2 - 10	10.0 at f_R 2 - 10	f_L 2 - 18 f_I 1 - 18	15	16	20		2 - 18	
	LO 2 - 18		f_L 2 - 18								
	IF 1 - 8		f_I 1 - 18								
19	RF 2 - 18	+13	10.5 at f_R 10 - 18	10.5 at f_R 10 - 18	f_L 10 - 18 f_I 2 - 8						
	LO 2 - 18		f_L 10 - 18								
	IF 1 - 8		f_I 2 - 8								
20	RF 2 - 18	+13	11.0 at f_R 10 - 18	11.0 at f_R 10 - 18	f_L 2 - 10 f_I 1 - 8						
	LO 2 - 18		f_L 2 - 10								
	IF 1 - 8		f_I 1 - 8								
21	RF 2 - 18	+10	10 at f_R 2 - 10	10 at f_R 2 - 10	f_L 2 - 14 f_I 0.03 - 4	15	16	20		2 - 8	
	LO 2 - 18		f_L 2 - 14								
	IF DC - 4.0		f_I 0.03 - 4				15	8 - 18			

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

Part number	Frequency range (MHz)	L0 power input (dBm)	Maximum conversion loss (SSB) (dB)	Noise figure (SSB) (dB)	ISOLATION (SSB)									
									minimum					
									L0- RF		RF- IF		L0 frequency (MHz)	
					dB	(MHz)	dB	(MHz)	dB	(MHz)	dB	(MHz)	dB	(MHz)
M28837/3-01	RF 8,000 - 12,400 LO 8,000 - 12,400 IF DC - 1,000	+7	f _L and f _R 8,000 - 12,400 7.5 at f _I DC - 200 10.5 at f _I 200 - 1,000	f _L and f _R 8,000 - 12,400 7.5 at f _I DC - 200 11.5 at f _I 200 - 1,000	-6	N/A	N/A	N/A	8,000 - 12,400					
M28837/5-01	RF 300 - 1,000 LO 300 - 1,000 IF DC - 1,000	+7	8.0 at f _L and f _R 300 - 1,000 f _I DC - 200	8.0 at f _L and f _R 300 - 1,000 f _I 10 - 200	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 _L and f _R 1,000 - 1,500 f _I DC - 1,000	8.5 at f _L and f _R 1,000 - 1,500 f _I 30 - 1,000	25	15	N/A	1,000 - 4,200						
M28837/5-03	RF 0.2 - 500 LO 0.2 - 500 IF DC - 500	+7	6.5 at f _L , f _R and f _I 1 - 50	6.5 at f _L , f _R and f _I 1 - 50	45	40	35	2 - 50						
M28837/5-04	RF 1,000 - 4,000 LO 1,000 - 4,000 IF DC - 1,000	+20	8.0 at f _L 1,200 - 4,000 f _R 1,200 - 3,500 f _I DC - 500	8.0 at f _L 1,200 - 4,000 f _R 1,200 - 3,500 f _I DC - 500	20	10	N/A	1,000 - 4,000						
M28837/5-05	RF 2,500 - 5,500 LO 2,500 - 7,000 IF DC - 1,500	+9	6.5 at f _L 3,000 - 5,500 f _R 3,000 - 5,000 f _I 30 - 500	6.5 at f _L 3,000 - 5,500 f _R 3,000 - 5,000 f _I 30 - 500	30	17	20	2,500 - 7,000						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	7.0 at f _L 4,000 - 10,000 f _R 5,000 - 9,000 f _I 30 - 1,000	7.0 at f _L 4,000 - 10,000 f _R 5,000 - 9,000 f _I 30 - 1,000	25	20	15	2,500 - 9,000						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	8.0 at f _L 2,500 - 11,000 f _R 4,500 - 9,500 f _I 30 - 2,000	15	10	15	4,000 - 11,500						
M28837/5-06	RF 4,500 - 9,500 LO 2,500 - 11,500 IF DC - 2,000	+10</												

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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)	(MHz)	ISOLATION (SSB)					
							LO - RF	LO - IF	RF - IF	LO - RF	LO frequency (MHz)	LO frequency (MHz)
M28837/5-07	RF 7,000 - 18,000 LO 5,000 - 18,000 IF DC - 3,000	+10	8.0 at f_L 5,000 - 18,000 f_R 7,000 - 16,000 f_I 30 - 3,000	8.0 at f_L 5,000 - 18,000 f_R 7,000 - 16,000 f_I 30 - 3,000	8.0 at f_L 5,000 - 18,000 f_R 7,000 - 16,000 f_I 30 - 3,000	5,000 - 14,000	22					
							15					
								12				
								22				
M28837/5-08	RF 1,000 - 18,000 LO 2,000 - 18,000 IF DC - 5,000	+13	8.0 at f_L 5,000 - 13,000 f_R 5,000 - 13,000 f_I 30 - 2,000	8.0 at f_L 5,000 - 13,000 f_R 5,000 - 13,000 f_I 30 - 2,000	8.0 at f_L 5,000 - 13,000 f_R 5,000 - 13,000 f_I 30 - 2,000	2,000 - 18,000	18	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_L 2,000 - 18,000 f_R 2,000 - 16,000 f_I 30 - 4,000	9.0 at f_L 2,000 - 18,000 f_R 2,000 - 16,000 f_I 30 - 4,000	9.0 at f_L 2,000 - 18,000 f_R 2,000 - 16,000 f_I 30 - 4,000	2,000 - 8,000						
M28837/5-10	RF 2,000 - 18,000 LO 2,000 - 18,000 IF DC - 4,000	+10	10.0 at f_L 2,000 - 18,000 f_R 1,000 - 18,000 f_I 30 - 5,000	10.0 at f_L 2,000 - 18,000 f_R 1,000 - 18,000 f_I 30 - 5,000	10.0 at f_L 2,000 - 18,000 f_R 1,000 - 18,000 f_I 30 - 5,000	2,000 - 18,000						

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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	GHz 4-8	MHz 30	mW 1-2

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

Part number	Frequency range (MHz)	L0 power input (dBm)	Maximum conversion loss (SSB) (dB)	Noise figure (SSB) (dB)	(MHz)	ISOLATION (SSB)				
						minimum				
						L0- RF- dB dB	L0- IF- dB dB	RF- IF- dB dB	L0 frequency (MHz)	
M28837/6-01	L0 3.0 - 1,000	+7	7.5 at f_L and f_R 10 - 100 f_I DC - 100		(MHz)	40	40	N/A	3 - 100	
	RF 3.0 - 1,000									
	IF DC - 1,000					30	20	N/A	100 - 1,000	

TABLE VI. Mixer stages with T0-5 configuration.

Part number	Frequency range (MHz)	L0 power input (dBm)	Maximum conversion loss (SSB) (dB)	Noise figure (SSB) (dB)	(MHz)	ISOLATION (SSB)				
						minimum				
						L0- RF- dB dB	L0- IF- dB dB	RF- IF- dB dB	L0 frequency (MHz)	
M28837/7-01	RF 10 - 500	+7	7.0 at f_L and f_R 10 - 200 f_I DC - 200		(MHz)	40	35	25	10 - 50	
	L0 10 - 500					35	30	20	50 - 100	
	IF DC - 500					30	25	15	100 - 200	
M28837/7-03	RF 10 - 500	+7	8.0 at f_L and f_R 200 - 350 f_I DC - 350		(MHz)	30	25	15	100 - 200	
	L0 10 - 500					25	15	10	200 - 500	
	IF DC - 500									
M28837/7-03	RF 10 - 500	+7	9.0 at f_L and f_R 350 - 500 f_I DC - 500		(MHz)	40	35	25	10 - 50	
	L0 10 - 500					35	30	20	50 - 100	
	IF DC - 500					30	25	15	100 - 200	
M28837/7-03	RF 10 - 500	+7	6.5 at f_L and f_R 1 - 200 f_I DC - 200		(MHz)	45	30	N/A	0.4 - 60	
	L0 0.4 - 500									
	IF DC - 500					30	20	N/A	60 - 500	

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TABLE VII. Mixer stages with PC 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-RF	IF-IF	IF-RF	LO frequency (MHz)
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	40	40	N/A	N/A	5 - 50
	LO 5 - 800		7.0 at f_L and f_R 500 - 800			30	30	N/A	N/A	50 - 100
	IF DC - 800				7.0 at f_L and f_R 500 - 800 f_I 0.4 - 800	20	20	N/A	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-RF	IF-IF	IF-RF	LO frequency (MHz)
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	40	35	30	10 - 50	10 - 50
	LO 10 - 1,000					20	25	15	50 - 750	50 - 750
	IF DC - 1,200					15	17	10	750 - 1,000	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	35	35		110 - 100	110 - 100
	LO 10 - 1,000					25	25		100 - 400	100 - 400
	IF DC - 600					18	18		1400 - 1,000	1400 - 1,000
								12	10 - 1,000	10 - 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	35	30		10 - 500	10 - 500
	LO 10 - 1,500					28	20		500 - 1,200	500 - 1,200
	IF DC - 800					25	18		1,200 - 1,500	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	35	28		110 - 500	110 - 500
	LO 10 - 1,600					28	20		500 - 1,000	500 - 1,000
	IF DC - 800					25	15		1,000 - 1,600	1,000 - 1,600

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(Project 5985-0993)

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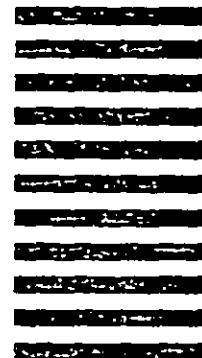
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