

# Frequency Mixer

ADE-13

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	CONVERSION LOSS IF FIXED @IF(OUT)=50MHz (dB)		
		@LO (dBm)		
		+4	+7	+10
10.1	60.1	6.99	6.45	6.28
70.4	120.4	7.83	7.31	7.08
130.7	180.7	7.78	7.31	7.09
191.0	241.0	7.84	7.36	7.14
251.3	301.3	7.88	7.44	7.20
311.5	361.5	7.92	7.47	7.21
371.8	421.8	8.01	7.54	7.30
432.1	482.1	8.05	7.59	7.29
492.4	542.4	8.16	7.66	7.43
552.7	602.7	8.21	7.68	7.38
613.0	663.0	8.37	7.87	7.53
673.3	723.3	8.45	8.01	7.72
733.6	783.6	8.36	7.99	7.76
793.9	843.9	8.29	7.85	7.63
834.0	884.0	8.25	7.78	7.56
894.3	944.3	8.26	7.73	7.49
934.5	984.5	8.35	7.77	7.50
994.8	1044.8	8.38	7.78	7.45
1035.0	1085.0	8.45	7.85	7.48
1095.3	1145.3	8.50	7.93	7.52
1135.5	1185.5	8.59	8.03	7.63
1195.8	1245.8	8.66	8.19	7.83
1236.0	1286.0	8.66	8.27	7.94
1296.3	1346.3	8.57	8.21	7.91
1336.4	1386.4	8.53	8.12	7.80
1396.7	1446.7	8.43	7.95	7.63
1436.9	1486.9	8.34	7.83	7.58
1497.2	1547.2	8.26	7.78	7.53
1537.4	1587.4	8.24	7.77	7.55
1597.7	1647.7	8.21	7.82	7.60
1637.9	1687.9	8.30	7.89	7.68
1698.2	1748.2	8.37	7.99	7.80
1738.4	1788.4	8.47	8.09	7.89
1798.7	1848.7	8.66	8.24	8.06
1838.9	1888.9	8.81	8.40	8.23
1899.1	1949.1	9.11	8.65	8.47
1939.3	1989.3	9.36	8.86	8.71
1999.6	2049.6	9.70	9.18	9.01
2039.8	2089.8	10.02	9.48	9.28
2100.1	2150.1	10.34	9.81	9.65

RF (IN) (MHz)	LO (MHz)	IP3 INPUT (dBm)		
		@LO (dBm)		
		+4	+7	+10
10.1	60.1	12.96	14.60	14.33
70.4	120.4	11.58	11.86	12.62
130.7	180.7	10.12	12.39	15.54
191.0	241.0	10.53	14.51	18.86
251.3	301.3	11.97	18.67	15.66
311.5	361.5	14.11	14.42	14.58
371.8	421.8	14.39	12.91	13.72
432.1	482.1	12.48	12.13	13.24
492.4	542.4	9.96	10.90	11.25
552.7	602.7	8.54	9.82	13.43
613.0	663.0	8.19	9.08	10.67
673.3	723.3	7.64	8.35	9.40
733.6	783.6	7.67	8.68	9.82
793.9	843.9	7.36	10.43	13.39
834.0	884.0	7.24	10.11	12.62
894.3	944.3	7.24	8.77	11.53
934.5	984.5	7.80	8.35	10.76
994.8	1044.8	8.36	8.94	9.68
1035.0	1085.0	8.19	9.47	9.75
1095.3	1145.3	7.78	9.94	11.05
1135.5	1185.5	7.09	9.37	12.00
1195.8	1245.8	6.07	7.60	10.02
1236.0	1286.0	5.30	6.06	7.53
1296.3	1346.3	5.16	5.36	6.08
1336.4	1386.4	5.47	6.08	7.42
1396.7	1446.7	6.90	8.93	11.09
1436.9	1486.9	8.57	10.96	12.78
1497.2	1547.2	9.11	11.79	13.81
1537.4	1587.4	9.04	11.85	14.25
1597.7	1647.7	9.41	13.06	14.75
1637.9	1687.9	9.29	12.50	14.65
1698.2	1748.2	9.31	12.84	14.68
1738.4	1788.4	8.77	12.55	14.72
1798.7	1848.7	8.23	11.41	13.71
1838.9	1888.9	7.95	11.50	13.36
1899.1	1949.1	7.58	11.02	14.40
1939.3	1989.3	7.46	10.67	13.26
1999.6	2049.6	8.53	11.63	14.58
2039.8	2089.8	7.66	11.28	12.90
2100.1	2150.1	8.65	13.36	14.27

RF (IN) (MHz)	LO (MHz)	COMPRESSION @RF IN=+1dBm (dB)		
		@LO (dBm)		
		+4	+7	+10
10.1	60.1	20.57	16.95	4.37
70.4	120.4	1.16	0.70	0.43
130.7	180.7	1.17	0.75	0.54
191.0	241.0	1.14	0.74	0.48
251.3	301.3	1.27	0.88	0.58
311.5	361.5	1.27	0.92	0.72
371.8	421.8	1.36	0.96	0.73
432.1	482.1	1.39	1.04	0.85
492.4	542.4	1.49	1.11	0.83
552.7	602.7	1.34	1.10	0.86
613.0	663.0	1.45	1.11	1.04
673.3	723.3	1.34	1.04	0.86
733.6	783.6	1.25	0.96	0.79
793.9	843.9	1.43	1.13	1.06
834.0	884.0	1.33	1.06	0.96
894.3	944.3	1.35	1.23	1.05
934.5	984.5	1.26	1.15	1.00
994.8	1044.8	1.11	1.06	0.93
1035.0	1085.0	1.06	0.93	0.87
1095.3	1145.3	1.06	0.92	0.89
1135.5	1185.5	1.09	0.89	0.89
1195.8	1245.8	1.07	0.91	0.88
1236.0	1286.0	1.08	0.78	0.74
1296.3	1346.3	1.15	0.80	0.75
1336.4	1386.4	1.21	0.92	0.82
1396.7	1446.7	1.38	0.96	0.69
1436.9	1486.9	1.39	0.98	0.66
1497.2	1547.2	1.49	0.91	0.58
1537.4	1587.4	1.44	0.79	0.52
1597.7	1647.7	1.38	0.72	0.44
1637.9	1687.9	1.46	0.71	0.48
1698.2	1748.2	1.27	0.61	0.35
1738.4	1788.4	1.28	0.54	0.34
1798.7	1848.7	1.20	0.54	0.29
1838.9	1888.9	1.30	0.63	0.29
1899.1	1949.1	1.20	0.53	0.30
1939.3	1989.3	1.17	0.51	0.31
1999.6	2049.6	1.15	0.52	0.23
2039.8	2089.8	1.09	0.51	0.21
2100.1	2150.1	0.99	0.39	0.25

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# Frequency Mixer

# ADE-13

## Typical Performance Data

IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=800.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=50.1MHz (dB)	IF (OUT) (MHz)	LO (MHz)	CONVERSION LOSS VS. IF FREQUENCY @RF(IN)=1600.1MHz (dB)
		@LO (dBm)			@LO (dBm)			@LO (dBm)
		+7			+7			+7
790.0	10.1	7.44	50.0	100.1	7.20	1000.0	600.1	7.56
771.0	29.1	7.48	70.2	120.3	7.33	979.8	620.3	7.42
752.1	48.0	7.45	90.4	140.5	7.23	959.6	640.5	7.39
733.1	67.0	7.49	110.6	160.7	7.22	939.4	660.7	7.39
714.1	86.0	7.53	130.9	181.0	7.16	919.1	681.0	7.39
695.1	105.0	7.57	151.1	201.2	7.17	898.9	701.2	7.39
676.2	123.9	7.55	171.3	221.4	7.12	878.7	721.4	7.38
657.2	142.9	7.55	191.5	241.6	7.15	858.5	741.6	7.30
638.2	161.9	7.55	211.7	261.8	7.10	838.3	761.8	7.31
619.2	180.9	7.57	231.9	282.0	7.07	818.1	782.0	7.31
600.3	199.8	7.58	252.1	302.2	7.03	797.9	802.2	7.31
581.3	218.8	7.58	272.3	322.4	7.02	777.7	822.4	7.29
562.3	237.8	7.54	292.6	342.7	7.02	757.4	842.7	7.27
543.3	256.8	7.57	312.8	362.9	6.98	737.2	862.9	7.25
524.4	275.7	7.57	333.0	383.1	6.96	717.0	883.1	7.25
505.4	294.7	7.56	353.2	403.3	6.96	696.8	903.3	7.27
486.4	313.7	7.59	373.4	423.5	6.90	676.6	923.5	7.21
467.4	332.7	7.58	393.6	443.7	6.89	656.4	943.7	7.26
448.5	351.6	7.57	413.8	463.9	7.00	636.2	963.9	7.26
429.5	370.6	7.63	434.0	484.1	7.00	616.0	984.1	7.37
410.5	389.6	7.61	454.3	504.4	6.88	595.7	1004.4	7.46
391.5	408.6	7.60	474.5	524.6	6.90	575.5	1024.6	7.51
372.6	427.5	7.60	494.7	544.8	6.90	555.3	1044.8	7.62
353.6	446.5	7.67	514.9	565.0	6.87	535.1	1065.0	7.72
334.6	465.5	7.65	535.3	605.4	6.85	494.7	1105.4	7.87
315.6	484.5	7.75	555.5	625.6	6.88	474.5	1125.6	7.95
296.7	503.4	7.77	616.0	666.1	6.92	434.0	1166.1	8.03
277.7	522.4	7.77	636.2	686.3	6.89	413.8	1186.3	8.10
258.7	541.4	7.79	676.6	726.7	6.92	373.4	1226.7	8.03
239.7	560.4	7.75	696.8	746.9	6.94	353.2	1246.9	8.00
220.8	579.3	7.83	737.2	787.3	6.94	312.8	1287.3	8.01
201.8	598.3	7.81	757.4	807.5	6.93	292.6	1307.5	8.05
182.8	617.3	7.88	797.9	848.0	6.95	252.1	1348.0	8.07
163.8	636.3	7.86	818.1	868.2	6.93	231.9	1368.2	8.09
144.9	655.2	7.90	858.5	908.6	6.95	191.5	1408.6	8.06
125.9	674.2	7.94	878.7	928.8	6.97	171.3	1428.8	7.99
106.9	693.2	7.94	919.1	969.2	7.02	130.9	1469.2	7.91
87.9	712.2	8.01	939.4	989.5	7.12	110.6	1489.5	7.91
69.0	731.1	7.95	979.8	1029.9	7.22	70.2	1529.9	7.81
50.0	750.1	7.95	1000.0	1050.1	7.28	50.0	1550.1	7.80

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## Typical Performance Data

LO (MHz)	LO-RF ISOLATION (dB)			LO-IF ISOLATION (dB)		
	@LO (dBm)			@LO (dBm)		
	+4	+7	+10	+4	+7	+10
10.1	58.40	53.85	54.17	57.27	57.85	67.92
70.4	52.12	49.64	48.36	52.89	52.37	53.05
130.7	47.33	45.42	44.30	47.21	47.33	47.37
191.0	44.65	42.99	42.07	43.93	44.13	44.26
251.3	42.83	41.47	40.50	41.70	41.90	41.95
311.5	41.55	40.22	39.17	40.05	40.24	40.32
371.8	40.45	39.07	38.05	38.70	38.83	38.90
432.1	39.37	38.20	37.21	37.60	37.75	37.81
492.4	37.63	36.68	35.93	36.84	37.08	37.19
552.7	35.74	35.08	34.46	35.92	36.13	36.24
613.0	34.23	33.78	33.49	35.36	35.51	35.54
673.3	33.16	32.51	32.09	35.04	35.26	35.32
733.6	32.00	31.51	31.03	34.67	34.87	34.96
793.9	31.12	30.86	30.41	34.51	34.56	34.54
834.0	30.56	30.66	30.34	34.51	34.45	34.34
894.3	29.17	29.63	29.73	34.78	34.74	34.59
934.5	28.44	28.79	28.98	34.94	34.92	34.70
994.8	27.56	27.75	27.93	34.99	35.08	34.83
1035.0	27.31	27.52	27.72	34.97	35.05	34.82
1095.3	26.61	26.88	27.13	35.02	35.15	34.99
1135.5	26.18	26.44	26.69	35.10	35.23	35.13
1195.8	25.86	26.10	26.32	35.68	35.80	35.74
1236.0	25.68	25.88	25.98	35.93	36.06	35.94
1296.3	26.04	26.53	26.76	36.52	36.58	36.40
1336.4	26.09	26.88	27.35	36.85	36.83	36.65
1396.7	25.83	26.89	27.71	36.83	37.03	37.07
1436.9	25.59	26.70	27.61	36.77	37.40	37.86
1497.2	24.92	26.01	27.02	36.69	38.32	39.68
1537.4	24.64	25.76	26.82	36.43	38.61	40.53
1597.7	24.35	25.49	26.62	35.96	38.70	41.38
1637.9	24.33	25.47	26.62	35.52	38.33	41.24
1698.2	24.63	25.75	26.88	35.08	37.77	40.66
1738.4	24.96	26.01	27.09	34.63	37.12	39.69
1798.7	25.73	26.55	27.41	34.15	36.23	38.26
1838.9	26.33	26.87	27.45	33.66	35.37	36.95
1899.1	27.49	27.48	27.55	33.10	34.27	35.22
1939.3	28.38	27.87	27.50	32.86	33.65	34.20
1999.6	30.05	28.46	27.40	32.22	32.48	32.57
2039.8	30.86	28.57	27.14	31.72	31.60	31.41
2100.1	31.54	28.52	26.70	31.02	30.52	30.13

RF (IN) (MHz)	LO (MHz)	RF-IF ISOLATION (dB)		
		@LO (dBm)		
		+4	+7	+10
10.1	60.1	40.57	32.81	35.25
70.4	120.4	38.58	41.02	39.90
130.7	180.7	34.36	35.50	36.15
191.0	241.0	31.54	32.17	32.68
251.3	301.3	29.41	30.16	30.75
311.5	361.5	27.86	28.48	29.03
371.8	421.8	26.62	27.32	28.05
432.1	482.1	25.64	26.57	27.29
492.4	542.4	25.08	25.88	26.60
552.7	602.7	24.92	25.85	26.64
613.0	663.0	25.07	26.14	27.18
673.3	723.3	25.42	26.66	27.69
733.6	783.6	25.83	27.31	28.43
793.9	843.9	25.72	27.25	28.20
834.0	884.0	25.05	26.33	26.80
894.3	944.3	23.83	24.60	24.83
934.5	984.5	23.35	23.98	24.21
994.8	1044.8	22.97	23.35	23.51
1035.0	1085.0	23.05	23.38	23.39
1095.3	1145.3	23.84	23.95	23.74
1135.5	1185.5	24.65	24.67	24.27
1195.8	1245.8	26.33	26.00	25.23
1236.0	1286.0	26.91	26.41	25.52
1296.3	1346.3	25.00	24.10	23.09
1336.4	1386.4	22.83	21.77	20.74
1396.7	1446.7	19.86	18.76	17.94
1436.9	1486.9	18.06	17.10	16.45
1497.2	1547.2	15.92	15.13	14.64
1537.4	1587.4	14.72	14.01	13.58
1597.7	1647.7	13.16	12.47	12.07
1637.9	1687.9	12.38	11.64	11.22
1698.2	1748.2	11.27	10.52	10.08
1738.4	1788.4	10.67	9.87	9.41
1798.7	1848.7	9.79	8.94	8.47
1838.9	1888.9	9.25	8.38	7.89
1899.1	1949.1	8.56	7.64	7.14
1939.3	1989.3	8.15	7.21	6.70
1999.6	2049.6	7.57	6.60	6.07
2039.8	2089.8	7.32	6.33	5.79
2100.1	2150.1	6.71	5.81	5.31

## Typical Performance Data

RF (IN) (MHz)	LO (MHz)	RF VSWR (:1)		
		@LO (dBm)		
		+4	+7	+10
10.1	60.1	1.33	1.26	1.20
70.4	120.4	1.19	1.03	1.14
130.7	180.7	1.20	1.03	1.08
191.0	241.0	1.25	1.09	1.02
251.3	301.3	1.28	1.14	1.07
311.5	361.5	1.32	1.18	1.11
371.8	421.8	1.41	1.27	1.19
432.1	482.1	1.50	1.36	1.27
492.4	542.4	1.58	1.44	1.37
552.7	602.7	1.66	1.50	1.40
613.0	663.0	1.77	1.62	1.51
673.3	723.3	1.84	1.72	1.63
733.6	783.6	1.85	1.75	1.69
793.9	843.9	1.84	1.73	1.68
834.0	884.0	1.88	1.78	1.75
894.3	944.3	1.88	1.78	1.77
934.5	984.5	1.96	1.82	1.81
994.8	1044.8	1.99	1.82	1.79
1035.0	1085.0	2.02	1.84	1.76
1095.3	1145.3	2.04	1.88	1.77
1135.5	1185.5	2.13	1.97	1.85
1195.8	1245.8	2.04	1.93	1.82
1236.0	1286.0	2.03	1.94	1.85
1296.3	1346.3	1.93	1.84	1.77
1336.4	1386.4	1.88	1.77	1.71
1396.7	1446.7	1.75	1.64	1.61
1436.9	1486.9	1.66	1.57	1.56
1497.2	1547.2	1.54	1.48	1.48
1537.4	1587.4	1.47	1.42	1.43
1597.7	1647.7	1.38	1.35	1.37
1637.9	1687.9	1.32	1.29	1.32
1698.2	1748.2	1.23	1.22	1.27
1738.4	1788.4	1.18	1.18	1.24
1798.7	1848.7	1.19	1.04	1.11
1838.9	1888.9	1.08	1.12	1.24
1899.1	1949.1	1.12	1.13	1.24
1939.3	1989.3	1.08	1.17	1.30
1999.6	2049.6	1.16	1.28	1.41
2039.8	2089.8	1.16	1.26	1.39
2100.1	2150.1	1.24	1.40	1.54

LO (MHz)	LO VSWR (:1)		
	@LO (dBm)		
	+4	+7	+10
10.1	1.80	2.37	3.52
70.4	1.83	2.60	3.59
130.7	1.82	2.58	3.55
191.0	1.83	2.57	3.51
251.3	1.84	2.57	3.51
311.5	1.85	2.58	3.51
371.8	1.90	2.66	3.60
432.1	1.90	2.63	3.55
492.4	1.92	2.65	3.54
552.7	1.99	2.74	3.67
613.0	2.00	2.72	3.58
673.3	2.03	2.74	3.59
733.6	2.12	2.85	3.73
793.9	2.12	2.80	3.62
834.0	2.19	2.88	3.70
894.3	2.20	2.83	3.59
934.5	2.31	2.97	3.75
994.8	2.34	2.98	3.72
1035.0	2.41	3.07	3.82
1095.3	2.44	3.10	3.85
1135.5	2.48	3.14	3.89
1195.8	2.52	3.17	3.90
1236.0	2.56	3.20	3.94
1296.3	2.55	3.13	3.82
1336.4	2.57	3.15	3.84
1396.7	2.51	3.01	3.66
1436.9	2.53	3.03	3.70
1497.2	2.50	2.98	3.63
1537.4	2.57	3.06	3.71
1597.7	2.69	3.14	3.76
1637.9	2.82	3.24	3.85
1698.2	2.99	3.35	3.92
1738.4	3.15	3.47	4.02
1798.7	3.33	3.58	4.07
1838.9	3.52	3.72	4.20
1899.1	3.72	3.82	4.22
1939.3	3.92	3.98	4.37
1999.6	4.15	4.08	4.37
2039.8	4.38	4.27	4.55
2100.1	4.57	4.37	4.59

IF (OUT) (MHz)	IF VSWR @LO=1600.1MHz (:1)		
	@LO (dBm)		
	+4	+7	+10
50.1	1.35	1.44	1.50
69.9	1.41	1.50	1.53
89.7	1.36	1.43	1.49
109.5	1.32	1.40	1.45
129.3	1.35	1.39	1.48
149.1	1.35	1.43	1.49
168.9	1.37	1.45	1.49
188.6	1.35	1.42	1.46
208.4	1.32	1.41	1.45
228.2	1.34	1.41	1.46
248.0	1.35	1.42	1.47
267.8	1.34	1.41	1.47
287.6	1.31	1.38	1.44
307.4	1.31	1.37	1.42
327.2	1.31	1.38	1.43
347.0	1.33	1.39	1.44
366.8	1.32	1.39	1.44
386.6	1.31	1.39	1.43
406.4	1.30	1.37	1.42
426.1	1.31	1.39	1.43
445.9	1.30	1.38	1.43
465.7	1.29	1.36	1.42
505.3	1.27	1.35	1.40
525.1	1.27	1.35	1.40
564.7	1.26	1.33	1.39
584.5	1.25	1.33	1.39
624.1	1.25	1.32	1.39
643.9	1.26	1.33	1.40
683.4	1.26	1.34	1.40
703.2	1.27	1.34	1.41
742.8	1.32	1.39	1.45
762.6	1.36	1.42	1.47
802.2	1.38	1.44	1.49
822.0	1.42	1.48	1.53
861.6	1.52	1.57	1.61
881.4	1.55	1.59	1.63
920.9	1.64	1.68	1.71
940.7	1.72	1.75	1.78
980.3	1.83	1.84	1.87
1000.1	1.89	1.89	1.91

## Harmonics Tables

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	5	10	26	42	8	24	23	49	34	44
1	-	19	0	31	18	22	37	26	38	42	48	48
2	104	46	57	56	57	45	46	63	39	52	53	58
3	119	52	55	59	56	66	57	55	71	59	60	82
4	119	94	71	67	78	69	82	73	71	86	64	75
5	117	84	94	87	98	88	86	86	91	93	90	85
6	120	104	89	101	91	87	89	83	94	97	93	97
7	109	103	102	104	97	99	104	104	92	95	101	112
8	111	107	102	107	118	102	107	101	96	85	97	99
9	119	92	101	102	100	104	98	105	105	94	95	108
10	112	105	104	99	102	104	107	98	98	100	92	88
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

Test conditions: RF IN: 820.1 MHz; -14.00 dBm.  
 LO IN: 850.1 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -22.4 dBm

RF HARMONICS ORDER

	(-dBm)	(-dBc)										
0	-	-	15	19	40	49	22	37	42	59	48	60
1	-	18	0	32	17	26	39	30	41	49	60	67
2	89	44	50	59	49	43	42	57	35	49	48	64
3	110	35	38	44	42	55	46	39	66	45	57	63
4	112	69	66	59	66	56	87	55	56	85	49	64
5	116	60	80	58	57	62	53	67	55	55	70	57
6	114	70	70	85	68	64	69	65	74	72	64	75
7	120	83	82	70	85	70	69	74	65	77	71	67
8	112	86	84	76	77	94	75	72	77	74	76	86
9	112	92	97	91	91	80	94	82	82	81	79	81
10	117	97	92	95	92	85	86	107	86	77	87	78
	RF CAL	0	1	2	3	4	5	6	7	8	9	10

### LO HARMONICS ORDER

Test conditions: RF IN: 820.1 MHz; -4.00 dBm.  
 LO IN: 850.1 MHz; +7.00 dBm  
 IF OUT: 30 MHz; -12.4 dBm

- Notes: 1. All Harmonics are in (dBc) relative to IF OUTPUT.  
 2. + entry denotes harmonics are in (dBc) above IF OUTPUT.  
 3. RF Cal represent the Harmonics level of the RF input signal to the mixer.

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