



# JBL PROFESSIONAL

## THIELE SMALL LOW FREQUENCY DRIVER PARAMETERS AND DEFINITIONS

June 1, 2004  
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NOTE: The Parameters marked with an asterisk(\*) are the minimum set required for a complete low-frequency system design.

### SMALL SIGNAL

PARAMETER	DESCRIPTION	UNITS
* $f_s$	Resonance frequency of driver in free-air	hertz
* $Q_{ts}$	Total Q of driver at " $f_s$ " including all driver loss mechanisms	dimensionless
* $Eff$	Reference efficiency $n_o$ (half-space acoustic load)	%
	Volume of air having same acoustic compliance as driver suspension	cubic feet
$Q_{es}$	Q of driver as " $f_s$ " considering electromagnetic damping only	dimensionless
$Q_{ms}$	Q of driver as " $f_s$ " considering mechanical loss mechanisms only (non-electromagnetic)	dimensionless
$L_c$	Voice coil inductance	mH

### LARGE SIGNAL

PARAMETER	DESCRIPTION	UNITS
* $P_e$ (Max)	Thermally-limited maximum electrical input power	watts
$X_{max}$	Peak linear displacement of driver diaphragm	millimeters
$S_D$	Effective projected surface area of driver diaphragm	square meters
* $V_D$	Peak displacement volume of driver diaphragm(0 to peak)	cubic inches
* $R_E$	dc resistance of driver voice coil	ohms

### MISC.DATA

PARAMETER	DESCRIPTION	UNITS
$Dia$	Piston diameter	inches
$BL$	BL Product	N/A
$M_{ms}$	Effective moving mass	grams
$flux$	Flux density	tesla



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MODEL	FS	QTS	QMS	QES	VAS	EFF	PE	XMAX	RE	LE	SD	BI	MMS	FLUX
112A	40	0.21	4	0.22	34.0	0.9	60	2.79	5.8	0.3	0.018	12	22	0.95
116A	28	0.46	5	0.51	73.6	0.3	50	4.83	5.2	0.6	0.018	6.7	25	0.85
122A	17	0.23	7	0.24	339.8	0.67	50	6.86	5.7	1.5	0.053	16	100	1.08
123A	25	0.49	8.5	0.52	235.1	0.68	50	7.87	4.4	0.6	0.049	8.9	85	1
124A	16	0.14	6	0.14	399.3	1.1	100	5.08	6.3	1.4	0.053	21	100	1.2
125A	25	43	7.5	0.46	235.1	0.77	50	4.83	5.2	0.7	0.049	7.5	32	0.85
127A	25	0.43	7.5	0.46	235.1	0.77	50	4.83	5.2	0.7	0.049	7.5	32	0.85
127H	25	0.43	7.5	46	237.9	0.77	50	4.83	6.6	0.7	0.032	7.5	33	1.07
127H-2	30.17	0.26	2.73	0.28	4.8	1.23	125		5.6	0.738	0.0345	11.3	34.6	11.3
127H-3	37	0.37	4.18	0.40	91	1.1	200	6	5.6	0.8	0.0358	10.8	36	
127H-4	64.3	0.5	3.08	0.60	27.9	1.2	200	6	4.1	1.3	0.034	10	36	
128H	20	0.24	7	0.25	280.4	0.86	100	7.87	5.7	0.6	0.053	16	90	1.07
130A	37	0.18	4	0.19	297.4	7.7	100	2.03	5.7	0.8	0.090	22.5	70	1.1
136A	16	0.21	5.5	0.22	736.3	1.4	100	5.08	6.3	1.4	0.008	21	151	1.2
136HS	35	0.38	7.7	0.4	153.5	1.59	300	7.87	5	1.5	0.008	20	146	1.22
218F	45	0.38	4.2	0.42	26	0.55	200	15.7	1.8	0.15	0.215	6.1	31	
227H	34	0.43	10.53	0.45	77	0.70	120	7	5.75	3	0.0357	16.7	50	
252F	24	0.29	67	0.3	171	0.75	150	7	1.38	0.35	0.053	8.4	103	
252G	23	0.25	6.3	0.26	178	0.79	150	7	4.4	1.24	0.053	16.3	110	
506G	50	0.5	2.5	0.65	19.8	0.42	50	10.67	4.5	0.6	0.014	6	13	1.05
508G	45	0.6	7.5	0.65	42.5	0.66	100	10.41	5.9	0.7	0.021	7	17	1
1400	52	0.31	4.1	0.34	62.3	2.5	600	7.62	4.1	0.9	0.064	18.4	85	0.56
2012H	60	0.22	4.34	0.23	1.34	3.47	300	5	4.65		0.031	13.9	0.025	
2020H	66	0.25	5	0.26	51.5	5.43	400	5.08	4.8	0.02	0.053	18.3	44	1
2022H	75	0.4	4.3	0.44	42.5	3.9	300	6.35	4.6	0.7	0.053	14.6	43	1
2023H	67	0.37	5.5	0.37	48.8	3.5	300	8.6	5.25	1.6	0.0547	16.2	45	
2025H	48	0.22	4	0.23	78.4	3.55	400	7.11	3.9	0.15	0.053	16.6	55	1
2032H	57	0.54	5.5	0.6	133.1	4	300	6.35	4.2	0.6	0.088	12.8	65	1
2033H	50	0.42	7.8	0.44	170	4.3	300	8.6	5.2	1.6	0.091	16	69	
2035H	48	0.34	5	0.36	140.5	4.13	400	7.11	3.9	0.25	0.088	16.6	85	1
2035HPL-1	43	0.34	4.9	0.36	6.8	3.8	300	7	4.7	0.25	0.088	16.5	0.082	1
2042H	39	0.4	5	0.44	337.0	4.5	300	7.62	4.3	0.8	0.127	16.2	110	1
2104H	207	0.66	207	0.87	1.0	0.9	50	1.3	4.24	0.5	0.0062	4.8	3.6	1.25
2105H	200	0.53	3	0.65	1.0	1.2	25	1.52	6.1	0.3	0.006	6.6	3.5	1.35
2106H	386	0.88	12.36	0.95	0.2	1.5	100	0.418	4.68	0.64	0.0095	8.79	9.65	
2108	40	0.17	4.5	0.18	36.8	1.2	75	1.52	5.8	0.5	0.018	13	20	1.02
2110	60	0.31	3.5	0.34	34.0	2.1	25	2.54	6	0.3	0.021	6.8	11	0.85
2115A	55	0.48	4	0.54	34.0	1	30	5.59	5.5	0.3	0.018	6.8	11	0.85
2118H	85	0.35	2.4	0.4	14.2	2.1	100	3.05	5.5	0.6	0.021	11	17	1.05
2118J	85	0.35	2.4	0.4	14.2	2.1	100	3.05	10.3	0.9	0.021	15	17	1.05
2119H	78	0.37	4.5	0.37	0.5	1.68	175	2.54	5.3	0.55	0.0218			10
2120	65	0.36	4	0.4	45.3	3	75	1.52	6	0.4	0.032	10.3	17	1.02
2121	35	0.19	5.5	0.2	110.4	2.7	75	1.52	6.8	0.9	0.032	12.7	25	1
2121H	35	0.16	5.5	0.17	110.4	2.7	75	1.52	6	0.8	0.032	13.7	26	1.02
MODEL	FS	QTS	QMS	QES	VAS	EFF	PE	XMAX	RE	LE	SD	BI	MMS	FLUX



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2122H	40	0.23	1.9	0.26	65.1	2.4	100	3.05	5.8	0.6	0.032	13.2	28	1.02
2123H	85	0.32	2.5	0.37	19.8	3.5	250	2.54	4.2	0.4	0.032	13	25	1.07
2123J	85	0.32	2.5	0.37	19.8	3.5	250	2.54	8.7	0.8	0.032	18.7	25	1.07
2125	45	0.45	4.5	0.5	135.9	2.5	50	2.54	6	0.5	0.053	12.4	45	1
2130	50	0.2	4	0.21	121.8	6.9	100	1.52	6.3	0.6	0.053	18	35	1.2
2135	40	0.25	4	0.27	297.4	6.7	125	1.52	6.3	0.6	0.089	18	60	1.2
2142H	72	0.75	4.2	0.92	45.3	1.82	100	6.35	5.2	0.85	0.053	9.95	46	
2145A	30	0.51	12	0.53	155.8	0.76	50	3.56	5	0.4	0.044	9.4	50	1
2150	55	0.64	5	0.73	99.1	2.2	50	2.54	5.5	1	0.075	22.3	105	1.2
2152H	85	0.39	3.3	0.44	36.8	5.1	150	2.54	4.5	0.5	0.053			10.2
2155H	53	0.47	4.47	0.53	164.3	4.4	150	2.54	4.2	0.48	0.090			10.2
2168H	120	0.38	5.5	0.41	3.71	1.6	350	7	5.2	0.9	0.019	15.3	23	1
2168J	122	0.04	5.8	0.43	3.4	1.3	350	7	10.1	1.6	0.019	21.3	25.5	1
2169H	320	0.61	6.5	0.68	0.55	1.3	200	3	5.1	0.9	0.020	19.8	26	1
2202A	50	0.17	3.5	0.18	87.8	5.5	100	3.05	5.5	1	0.053	22	50	1.2
2202H	50	0.16	3.5	0.18	87.8	6	150	3.56	5.5	1.1	0.053	22.5	50	1.2
2202J	50	0.16	4.3	0.18	87.8	6	150	3.56	11	1.8	0.053	27.8	50	1.2
2203A	16	0.14	6	0.14	399.3	1.1	100	5.08	6.3	1.4	0.053	21	100	1.2
2203H	16	0.14	6	0.14	399.3	1.1	100	5.08	6.3	1.4	0.053	21	100	1.2
2204H	45	0.35	1.7	0.44	87.8	1.8	350	6.86	6.2	0.7	0.054	15	57	1.2
2204J	45	0.35	1.7	0.44	87.8	1.8	350	6.86	12.4	1.6	0.054	25.5	57	1.2
2205A	30	0.21	5	0.22	297.3	3.5	150	2.54	5.5	1.3	0.090	22.3	105	1.2
2205H	30	0.21	5	0.22	297.3	3.5	150	2.54	5.5	1.3	0.090	22.3	105	1.2
2206H	52	0.32	4.45	0.34	62.3	2.5	600	7.62	5.3	1.5	0.055	18.1	65	
2206J	52	0.34	4.5	0.37	62.0	2.21	600	7.62	9.9	3	0.055	24	66	1
2213	25	0.49	8.5	0.52	235.0	0.68	50	7.87	4.4	0.6	0.049	8.9	85	1
2213H	25	0.49	8.5	0.52	235.0	0.68	75	7.87	4.4	0.6	0.049	8.9	85	1
2214H	23	0.24	10.5	0.25	223.7	1.1	200	6.60	5.6	1.3	0.053	16	90	1.07
2215A	20	0.21	5.5	0.22	736.2	2.6	100	4.06	5.7	1	0.090	22	97	0.9
2215B	20	0.21	5.5	0.22	736.2	2.5	100	4.06	8.8	2.2	0.088	22	97	0.9
2215H	20	0.21	5.5	0.22	736.2	2.6	100	4.06	5.7	1	0.090	22	97	0.09
2217H	45	0.31	6	0.33	83.8	2.19	600	7.62	5	1.8	0.063	18.7	83	1
2220A	37	0.18	4	0.19	297.3	7.7	100	2.03	5.7	0.8	0.090	22.5	70	1.1
2220H	37	0.17	5	0.18	297.3	8.7	100							
2220J	37	0.17	5	0.18	297.3	8.7	100							
2225H	40	0.28	2.5	0.31	169.9	3.5	200	5.08	6.3	1.1	0.090	23	105	1.2
2225J	40	0.28	2.5	0.31	169.9	3.5	200	5.08	12.9	2.2	0.090	34	105	1.2
2226G	40	0.31	5	0.33	175.6	3.3	600	7.62	2.5	0.92	0.088	13.5	98	1.05
2226H	40	0.31	5	0.33	175.6	3.3	600	7.62	5	1.75	0.088	19.2	98	1
2226J	40	0.31	5	0.33	175.6	3.3	600	7.62	10	3.5	0.088	27.1	98	1
2227H	40	0.21	5	0.22	175.6	4.9	600	5.08	4.7	0.55	0.088	23	99	
2231A	16	0.21	5.5	0.22	736.2	1.4	100	5.08	6.3	1.4	0.088	21	151	1.2
2231H	16	0.21	5.5	0.22	736.2	1.4	100	5.08	6.3	1.4	0.088	21	151	1.2
2234H	23	0.22	2	0.25	458.7	2.1	150	8.38	6	1.2	0.090	20.5	105	1.2
MODEL	FS	QTS	QMS	QES	VAS	EFF	PE	XMAX	RE	LE	SD	BI	MMS	FLUX



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2235H	20	0.25	2.5	0.28	458.7	1.3	150	8.38	6	1.2	0.090	20.5	155	1.2
2240G	30	0.25	2.5	0.25	481.4	5	300	5.59	2.5	0.7	0.130	17.1	164	1.22
2240H	30	0.23	2.2	25	481.4	5	300	5.59	6	1.4	0.130	25	164	1.22
2241G	35	0.4	5.7	0.43	311.5	2.9	600	7.62	2.5	0.86	0.123	13.6	145	
2241H	35	0.4	5.7	0.43	311.5	2.9	600	7.62	5	1.75	0.123	19.2	145	
2242H	35	0.28	5	0.29	282.3	4	800	7.87	4.7	1.25	0.124	23.7	158	
2245H	20	0.27	2.2	0.27	821.2	2.1	300	9.65	5.8	1.4	0.130	21	185	1.22
2250H	188	0.47	4.5	0.53	1.67	2	350	3	5.2	1	0.0204	17	25	1.0
2250J	185	0.45	4.8	0.47	1.5	2.3	350	3.0	8.7	1.7	0.0204	22.5	24	1
2251J	61	0.2	4	0.21	1.011	2.89	388	5.7	12.65		0.031	26.77	0.032	
2254J	46.63	0.16	2.47	0.17	2.60	4.20	600	6.35	11.16		0.063	10.99	0.088	
2255H	39	0.30	3.68	0.33	170	2.9	650	8	5.0	1.5	0.088	20.1	109	
2256G	24.2	0.47	7.79	0.5	138.5		600	20.3	3.1	0.7	0.078	15.7	284	
2258H	31	0.27	4.82	0.28	407		800	8	5.2	1.24	0.124	22.3	140	
2262H	56.2	0.34	90.39	42.2	2.2	700	8	5.2		0.055	18	68.0		
D123	45	0.45	4.5	0.5	135.9	2.5	50	2.54	6	0.5	0.053	12.4	45	1
D130	40	0.25	4	0.27	297.3	6.7	75	0.76	6.3	0.6	0.090	18	60	1.2
D131	50	0.18	8.5	0.18	127.4	8.4	75	0.76	6.3	0.5	0.053	18	35	1.2
D208	60	0.31	3.5	0.34	34.0	2.1	25	2.54	6	0.3	0.021	6.8	11	0.85
E110	65	0.36	4	0.4	45.3	3	75	2.54	6	0.4	0.032	12.1	21	1.03
E120	60	0.17	1.8	0.19	79.3	8.6	150	3.05	6.3	0.4	0.053	21.7	36	1.35
E130	40	0.19	1.8	0.21	297.3	8.6	150	2.54	6.3	0.4	0.090	21.1	60	1.35
E140	32	0.17	5	0.19	297.3	4.9	200	3.56	5.5	1.11	0.090	24.1	94	1.35
E145	35	0.25	6	0.26	274.7	4.3	150	7.11	5.7	1.6	0.090	16.1	55	0.97
E155-4	30	0.2	2.2	0.22	424.8	4.9	300	5.08	2.5	0.7	0.114	17	125	1.22
E155-8	30	0.2	2.2	0.22	424.8	4.9	300	5.08	6	1.4	0.114	25	125	1.22
G125-8	65	0.32	5.5	0.34	70.8	5.5	200	2.54	5.2	0.5	0.053	13.7	37	0.98
G135-8	45	0.36	5.5	0.38	235.0	5.5	200	2.54	5.2	0.5	0.090	13.7	60	0.98
G135-A	45	0.48	6.6	0.51	218.0	3.8	200	6.10	6	0.75	0.090	15.8	60	0.98
K110	65	0.36	4	0.4	45.3	3	75	1.52	6	0.4	0.032	10.3	17	1.02
K120	50	0.2	4	0.21	121.8	6.9	100	1.52	6.3	0.6	0.053	18	35	1.2
K130	40	0.25	4	0.27	297.3	6.7	125	0.76	6.3	0.6	0.090	18	60	1.2
K140	30	0.21	5	0.22	297.3	3.5	150	5.08	5.5	1.3	0.090	22.3	105	1.2
K145	35	0.29	6	0.3	243.5	3.4	150	5.08	8.8	2.2	0.079	21.7	75	0.9
K151	30	0.27	6	0.28	365.3	3.4	150	2.54	6	2	0.107	22	125	1.2
LE5-10	250	1	3	1.6	0.7	0.69	25	1.52	6	0.05	0.006	4.3	3	1.3
LE8T	45	0.49	4	0.55	34.0	0.5	25	4.57	5.5	0.3	0.018	6.2	16	0.85
LE8TH	45	0.56	4	0.65	34.0	0.5	25	5.59	5.5	0.3	0.018	6.2	16	0.85
LE10A	30	0.41	6	0.44	101.9	0.6	75	6.10	4.4	0.6	0.032	8.1	35	1.02
LE10H	33	0.37	6.9	0.39	76.5	0.7	75	6.10	4.8	0.6	0.032	9.7	40	1.02
LE111A	25	0.17	6	0.18	101.9	0.87	75	6.10	5.7	1.5	0.032	16	50	1.08
LE12C	30	0.51	12	0.53	155.7	0.76	50	3.56	5	0.4	0.044	9.4	50	1
LE14A	28	0.32	6.5	0.34	147.2	0.95	100	5.08	6.3	1.4	0.066	21.5	140	1.2
LE14H	26	0.27	2.3	0.3	147.2	0.89	150	8.38	5.9	1.3	0.066	22	139	1.25
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LE15A	20	0.21	5.5	0.22	736.2	2.6	100	4.06	8.8	2.2	0.088	22	97	0.9
MI-10	75	0.33	1.8	0.41	36.8	3.5	150	3.05	5.6	0.6	0.034	11.6	21	1.05
MI-12	65	0.46	2.2	0.58	76.5	3.5	150	3.05	5.6	0.6	0.055	11.6	34	1.05
MI-15	55	0.62	2.8	0.79	169.9	3.5	150	3.05	5.6	0.6	0.090	11.6	55	1.05
MI-15A	40	0.42	4	0.47	271.8	3.5	150	3.56	5.6	0.9	0.090	11.6	55	1.05
M121-8	60	0.245	4	0.25	70.8	6	300	4.57	5.2	0.63	0.053	17.5	39	1
M151-4	50	0.28	6	0.3	148.7	5.92	300	5.08	2.4	0.42	0.088	13.6	74	1
M151-8	45	0.25	4.8	0.27	198.2	6.5	300	5.08	4.8	0.72	0.088	18.8	70	1
M112-8	79	0.36	2	0.44	0.45	4.8	225	5.1	5.2	1.2	0.0564	15.5	41.4	
M115-8	46	0.42	9.5	0.4	230	5	225	5.1	5.5	1.3	0.0830	13.9	53	
M115-8A	46	0.39	5.1	0.42	225	5	250	5.1	5.5	1.3	0.0845	14	53	
M209-8	91	0.39	2	0.48	13.3	2.01	150	1.78	4.9	0.27	0.022	9.5	16	1.05
M222-8	71	0.48	3.6	0.55	41.9	2.62	300	6.35	4.2	0.43	0.053	12.8	48	1
M252-8	51	0.56	4.6	0.64	137.1	2.71	300	6.35	4.2	0.43	0.088	12.8	79	1
MODEL	FS	QTS	QMS	QES	VAS	EFF	PE	XMAX	RE	LE	SD	BI	MMS	FLUX