

Rocket Mass Characteristics V4.3

9/3/2009

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Rocket Stage	Feed System	Propellant Mass (lbs)	Inert Mass (lbs)	Payload Mass (lbs)	Me	Mf	Mass Ratio	Structural Coefficient	Propellant Mass Fraction	Payload Mass Fraction	Ed's Ratio
Titan II Stage 1	Pump	246846	9670	71581	81251	328097	4.04	0.038	0.962	0.279	0.04
Atlas E with Booster	Pump	248640	13924	1800	15724	264364	16.81	0.053	0.947	0.007	0.06
SpaceX Falcon1 Stg 1	Pump	59779	3527	10946	14473	74252	5.13	0.056	0.944	0.173	0.06
Delta II Stage 1 (7925)	Pump	211902	12518	27237	39755	251657	6.33	0.056	0.944	0.121	0.06
Titan I Stage 1	Pump	161688	9562	48890	58452	220140	3.77	0.056	0.944	0.285	0.06
Delta II Stage 1 (Delta-Thor XLT-C)	Pump	211203	13448	241390	254838	466041	1.83	0.060	0.940	1.075	0.06
Kosmos 3M Stage 1	Pump	180600	11600	49190	60790	241390	3.97	0.060	0.940	0.256	0.06
Ariane 5 ECA Cryogenic Core	Pump	374786	26455	68745	95200	469986	4.94	0.066	0.934	0.171	0.07
Soyuz Sustainer Stage 2	Pump	198636	14429	90731	105160	303796	2.89	0.068	0.932	0.426	0.07
Proton M Stage 1	Pump	924641	67460	529092	596552	1521193	2.55	0.068	0.932	0.533	0.07
Atlas V 400 CCB Stage 1	Pump	626308	45730	76516	122246	748554	6.12	0.068	0.932	0.114	0.07
Proton M Stage 2	Pump	344170	25800	159122	184922	529092	2.86	0.070	0.930	0.430	0.07
Kosmos 3M Stage 2	Pump	41227	3163	4800	7963	49190	6.18	0.071	0.929	0.108	0.08
Angara 1.1 Stage 1	Pump	292333	22614	19644	42258	334591	7.92	0.072	0.928	0.062	0.08
Ariane 5G Cryogenic Core	Pump	350535	27557	68124	95681	446216	4.66	0.073	0.927	0.180	0.08
Proton M Stage 3	Pump	102652	8140	48330	56470	159122	2.82	0.073	0.927	0.436	0.08
Black Arrow Stage 1	Pump	28735	2355	8667	11022	39757	3.61	0.076	0.924	0.279	0.08
Agena B-Mod 1	Pump	15920	1352	8895	10247	26167	2.55	0.078	0.922	0.515	0.08
Titan II Stage 2	Pump	57902	5029	8650	13679	71581	5.23	0.080	0.920	0.137	0.09
Atlas V 400 Centaur CIIS Stage 2	Pump	45574	4220	20000	24220	69794	2.88	0.085	0.915	0.402	0.09
Soyuz Stage 3	Pump	55997	5192	29542	34734	90731	2.61	0.085	0.915	0.483	0.09
Soyuz Conical Booster Stage 1	Pump	86332	8342	31405	39747	126079	3.17	0.088	0.912	0.332	0.10
Saturn V AS-501 St1	Pump	4389000	449200	1418800	1868000	6257000	3.35	0.093	0.907	0.293	0.10
Delta II Stage 3 (7925 Star 48B)	Solid Fuel	4430	457	6479	6936	11366	1.64	0.094	0.906	1.326	0.10
Sea Dragon Stage 2 (proposed)	Pressure	9606054	1025839	1100000	2125839	11731893	5.52	0.096	0.904	0.103	0.11
Saturn 1B Stage 1	Pump	910155	99797	310208	410005	1320160	3.22	0.099	0.901	0.307	0.11
Sea Dragon Stage 1 (proposed)	Pressure	25277480	2939715	68785	3008500	28285980	9.40	0.104	0.896	0.002	0.12
Ariane EPS AR5E	Pressure	22046	2646	44093	46739	68785	1.47	0.107	0.893	1.786	0.12
Ariane EPS AR5G	Pressure	21385	2646	44093	46739	68124	1.46	0.110	0.890	1.835	0.12
Saturn V AS-501 St3	Pump	234100	29300	89800	119100	353200	2.97	0.111	0.889	0.341	0.13
Saturn V AS-501 St2	Pump	946700	119200	352000	471200	1417900	3.01	0.112	0.888	0.330	0.13
SpaceX Falcon1 Stg 2	Pressure	8881	1125	940	2065	10946	5.30	0.112	0.888	0.094	0.13
Titan I Stage 2	Pump	39738	5184	3968	9152	48890	5.34	0.115	0.885	0.088	0.13
Centaur I	Pump	27651	3688	10200	13888	41539	2.99	0.118	0.882	0.325	0.13

Ariane ESC-B	Pump	55116	7400	44093	51493	106609	2.07	0.118	0.882	0.705	0.13
Ariane ESC-A	Pump	32849	4600	44093	48693	81542	1.67	0.123	0.877	1.177	0.14
Black Arrow Stage 3	Solid Fuel	694	108	213	321	1015	3.16	0.135	0.865	0.266	0.16
Delta II Stage 2 (Delta K)	Pressure	13236	2092	6165	8257	21493	2.60	0.136	0.864	0.402	0.16
Black Arrow Stage 2	Pump	6522	1060	1115	2175	8697	4.00	0.140	0.860	0.147	0.16
Breeze M	Pressure	43652	7209	6415	13624	57276	4.20	0.142	0.858	0.126	0.17
Ariane Solid Booster	Solid Fuel	522495	88185	98592	186777	709272	3.80	0.144	0.856	0.161	0.17
Soyuz Fregat Stage 4	Pump	11795	2094	11023	13117	24912	1.90	0.151	0.849	0.794	0.18
Ausroc III (proposed)	Pressure	2603	495	330	825	3428	4.16	0.160	0.840	0.107	0.19
Sprite Stage 2 (proposed)	Pressure	9698	1851	3090	4941	14639	2.96	0.160	0.840	0.268	0.19
Angara 1.1 Stage 2 (Breeze M Core)	Pressure	11244	2426	5974	8400	19644	2.34	0.177	0.823	0.437	0.22
Scout B Stage 1	Solid Fuel	18998	4484.2	12842.9	17327.1	36325.1	2.10	0.191	0.809	0.547	0.24
Scud A (R11)	Pressure	8168	2105	1521	3626	11794	3.25	0.205	0.795	0.148	0.26
Viking 4	Pump	8030	2200	528	2728	10758	3.94	0.215	0.785	0.052	0.27
Scout B Stage 2	Solid Fuel	7320	2044.7	3478.2	5522.9	12842.9	2.33	0.218	0.782	0.371	0.28
Scud B (R17)	Pump	8314	2432	2178	4610	12924	2.80	0.226	0.774	0.203	0.29
Aerobee 150A Sustainer	Pressure	1055	307	200	507	1562	3.08	0.225	0.775	0.147	0.29
Scout B Stage 3	Solid Fuel	2084	660	734.2	1394.2	3478.2	2.49	0.241	0.759	0.268	0.32
V2	Pump	19176	6246	2150	8396	27572	3.28	0.246	0.754	0.085	0.33
Scout B Stage 4	Solid Fuel	456	178.2	100	278.2	734.2	2.64	0.281	0.719	0.158	0.39
Redstone Missile	Pump	37205	17697	6305	24002	61207	2.55	0.322	0.678	0.115	0.48
Wac Corporal Sustainer	Pressure	360	296	25	321	681	2.12	0.451	0.549	0.038	0.82