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Falcon-9

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Falcon-9 v1.0
(Dragon-QU) [SpaceX]



Falcon-9 v1.1(ex) (CASSIOPE)
[SpaceX]



Falcon-9 v1.1 (Dragon CRS-3)
[SpaceX]



Falcon-9 v1.2 (Iridium-NEXT 1)
[SpaceX]



Falcon-Heavy (Tesla Roadster)
[SpaceX]

Falcon-9 is a liquid fueled orbital launch vehicle for medium to heavy sized missions, which is developed by SpaceX (Space Exploration Technologies Corp.). It is technologically based on the [Falcon-1](#) launch vehicle. Both stages are Kerosene / LOX fueled.

The first stage, which is potentially reusable after recovery by parachutes (v1.0) or by powered landing (v1.1 and later), is powered by 9 of the SpaceX built Merlin-1C (v1.0) or Merlin-1D (v1.1) engines with regenerative cooling. The upper stage uses a single Merlin engine and will also be potentially reusable. The Falcon-9 is offered with a 5.2 m fairing.

Launch site for low inclination launches is Cape Canaveral launch pad SLC-40. High inclination launches will launch from Vandenberg AFB. An additional launch site near Brownsville, Texas, is also under consideration.

The Falcon-9 will also lift the Dragon space capsule for ISS cargo flights, which might be developed into a manned spacecraft.

The first flight for a Falcon-9 v1.0 took place in June 2010. In 2013, the enlarged Falcon-9 v1.1 took over, featuring higher powered Merlin-1D engines in a new octagonal arrangement and larger tanks.

The first landings on a barge was tried on the [Dragon CRS-5](#) and [Dragon CRS-6](#) missions, but both failed. The first mission of the Falcon-9 v1.2 performed a successful landing of the first stage on land. Some later flights might also use a floating barge for landing, if performance requires it.

Version	Strap-On	Stage 1	Stage 2
Falcon-9 v1.0	-	Stage 1 / 9 × Merlin-1C	Stage 2 / Merlin-1C-Vac
Falcon-9 v1.1	-	Stage 1 (str., reusable) / 9 × Merlin-1D	Stage 2 (str.) / Merlin-1D-Vac
Falcon-9 v1.1(ex)	-	Stage 1 (str.) / 9 × Merlin-1D	Stage 2 (str.) / Merlin-1D-Vac

Falcon-9 v1.2 (Falcon-9FT)	-	Stage 1 (str., reusable) / 9 × Merlin-1D (upr.)	Stage 2 (str. +) / Merlin-1D-Vac (upr.)
Falcon-9 v1.2(ex) (Falcon-9FT(ex))	-	Stage 1 (str.) / 9 × Merlin-1D (upr.)	Stage 2 (str. +) / Merlin-1D-Vac (upr.)
Falcon-9 v1.3 ? (Falcon-9 Block 5)	-	Stage 1 (str., reusable) / 9 × Merlin-1D (upr.+)	Stage 2 (str. +) / Merlin-1D-Vac (upr.+)
Falcon-9 ATB	-	Stage 1 (str.) / 3 × Merlin-1D	Dummy Stage 2 (str.) ?
Falcon-Heavy	2 × Stage 1 (str., reusable) / 9 × Merlin-1D	Stage 1 (str., reusable) / 9 × Merlin-1D	Stage 2 (str.) / Merlin-1D-Vac
Falcon-Heavy (ex)	2 × Stage 1 (str.) / 9 × Merlin-1D	Stage 1 (str.) / 9 × Merlin-1D	Stage 2 (str.) / Merlin-1D-Vac

Performance (kg)	LEO	LPEO	SSO	GTO	GEO	MolO	IP
Falcon-9 v1.0	9900			4050	-		
Falcon-9 v1.1(ex)	10450	9000	8159	4850	-		2473
Falcon-9 v1.1					-		
Falcon-9 v1.2 (Falcon-9FT)	22800			5300	-		4020
Falcon-9 v1.2(ex) (Falcon-9FT(ex))				6700	-		
Falcon-Heavy				8000			
Falcon-Heavy (ex)	63800			26700			16800

No.	TypNo	Type	Serial/Core	Date	LS	Payload
1	1	Falcon-9 v1.0	B0003	04.06.2010	CC SLC-40	Dragon Qualification Unit
2	2	Falcon-9 v1.0	.	08.12.2010	CC SLC-40	Dragon C1 / SMDC-ONE 1 / Qbx 1 / Qbx 2 / Mayflower-Caerus / Perseus 000 / Perseus 001 / Perseus 002 / Perseus 003
3	3	Falcon-9 v1.0	.	22.05.2012	CC SLC-40	Dragon C2 / Celestis 11
4	4	Falcon-9 v1.0	.	08.10.2012	p CC SLC-40	Dragon CRS-1 / Orbcomm FM101
5	5	Falcon-9 v1.0	.	01.03.2013	CC SLC-40	Dragon CRS-2
6	1	Falcon-9 v1.1(ex)	.	29.09.2013	Va SLC-4E	CASSIOPE 1 / CUSat / DANDE / POPACS 1 / POPACS 2 / POPACS 3
7	2	Falcon-9 v1.1(ex)	.	03.12.2013	CC SLC-40	SES 8
8	3	Falcon-9 v1.1(ex)	.	06.01.2014	CC SLC-40	ThaiCom 6
9	1	Falcon-9 v1.1	.	18.04.2014	n CC SLC-40	Dragon CRS-3 / OPALS↑ / HDEV↑ / ALL-STAR/THEIA / KickSat 1 / SporeSat 1 / TSAT / PhoneSat 2.5 /104 Sprites
10	2	Falcon-9 v1.1	.	14.07.2014	n CC SLC-40	Orbcomm FM103 / FM104 / FM106 / FM107 / FM109 / FM111 / Orbcomm-OG2 Mass Simulator
11	4	Falcon-9 v1.1(ex)	.	05.08.2014	CC SLC-40	AsiaSat 8
12	5	Falcon-9 v1.1(ex)	.	07.09.2014	CC SLC-40	AsiaSat 6
13	6	Falcon-9 v1.1(ex)	.	21.09.2014	CC SLC-40	Dragon CRS-4 / RapidScat↑ / SpinSat↑
14	3	Falcon-9 v1.1	.	10.01.2015	r CC SLC-40	Dragon CRS-5 / CATS↑ / Flock-1d' 1↑ / Flock-1d' 2↑ / AESP-14↑
15	4	Falcon-9 v1.1	.	11.02.2015	n CC SLC-40	DSCQR
16	7	Falcon-9 v1.1(ex)	.	02.03.2015	CC SLC-40	ABS 3A / Eutelsat 115 West B
17	5	Falcon-9 v1.1	.	14.04.2015	r CC SLC-40	Dragon CRS-6 / Flock-1e 1, ..., 14↑ / Arkyd 3-Reflight↑ / Centennial 1↑
18	8	Falcon-9 v1.1(ex)	.	27.04.2015	CC SLC-40	TurkmenAlem 52E
19	6	Falcon-9 v1.1	.	28.06.2015	F CC SLC-40	Dragon CRS-7 / IDA 1↑ / Flock-1f 1, ..., 8↑
20	1	Falcon-9 v1.2	B1019.1	22.12.2015	CC SLC-40	Orbcomm FM105 / FM108 / FM110 / FM112 / FM113 / FM114 / FM115 / FM116 / FM117 / FM118 / FM119 / Orbcomm-OG2 Mass Simulator 2
21	7	Falcon-9 v1.1	.	17.01.2016	r Va SLC-4E	Jason 3
22	2	Falcon-9 v1.2	B1020.1 ?	04.03.2016	r CC SLC-40	SES 9
23	3	Falcon-9 v1.2	B1021.1	08.04.2016	CC SLC-40	Dragon CRS-8 / BEAM↑
24	4	Falcon-9 v1.2	B1022.1	06.05.2016	CC SLC-40	JCSat 14
25	5	Falcon-9 v1.2	B1023.1	27.05.2016	CC SLC-40	ThaiCom 8
26	6	Falcon-9 v1.2	B1024.1 ?	15.06.2016	r CC SLC-40	Eutelsat 117 West B / ABS 2A
27	7	Falcon-9 v1.2	B1025.1	18.07.2016	CC SLC-40	Dragon CRS-9 / IDA 2↑
28	8	Falcon-9 v1.2	B1026.1 ?	14.08.2016	CC SLC-40	JCSat 16
--	--	Falcon-9 v1.2	B1028.1 ?	(01.09.2016)	F% CC SLC-40	AMOS 6
29	9	Falcon-9 v1.2	B1029.1	14.01.2017	Va SLC-4E	Iridium-NEXT 102 / 103 / 104 / 105 / 106 / 108 / 109 / 111 / 112 / 114
30	10	Falcon-9 v1.2	B1031.1	19.02.2017	CCK LC-39A	Dragon CRS-10 / SAGE 3↑ / STP-H5↑
31	1	Falcon-9 v1.2(ex)	B1030	16.03.2017	CCK LC-39A	Echostar 23
32	11	Falcon-9 v1.2	B1021.2	30.03.2017	CCK LC-39A	SES 10
33	12	Falcon-9 v1.2	B1032.1	01.05.2017	CCK LC-39A	NROL 76 (USA 276)
34	2	Falcon-9 v1.2(ex)	B1034	15.05.2017	CCK LC-39A	Inmarsat-5 F4 (GX 4)
35	13	Falcon-9 v1.2	B1035.1	03.06.2017	CCK LC-39A	Dragon CRS-11 / NICER↑ / MUSES↑ / ROSA↑ / Bird B↑ / Bird G↑ / Bird J↑ / Bird M↑ / Bird N↑
36	14	Falcon-9 v1.2	B1029.2	23.06.2017	CCK LC-39A	BulgariaSat 1
37	15	Falcon-9 v1.2	B1036.1	25.06.2017	Va SLC-4E	Iridium-NEXT 113 / 115 / 117 / 118 / 120 / 121 / 123 / 124 / 126 / 128
38	3	Falcon-9 v1.2(ex)	B1037	05.07.2017	CCK LC-39A	Intelsat 35e
39	16	Falcon-9 v1.2	B1039.1	14.08.2017	CCK LC-39A	Dragon CRS-12 / CREAM↑ / Kestrel Eye 2M↑ / Dellinger↑ / ASTERIA↑ / OSIRIS-3U
40	17	Falcon-9 v1.2	B1038.1	24.08.2017	Va SLC-4E	FORMOSAT 5
41	18	Falcon-9 v1.2	B1040.1	07.09.2017	CCK LC-39A	X-37B OTV-5 (USA 277) / (CubeSats)
42	19	Falcon-9 v1.2	B1041.1	09.10.2017	Va SLC-4E	Iridium-NEXT 107 / 119 / 122 / 125 / 127 / 129 / 132 / 133 / 136 / 139
43	20	Falcon-9 v1.2	B1031.2	11.10.2017	CCK LC-39A	Echostar 105/SES 11
44	21	Falcon-9 v1.2	B1042.1	30.10.2017	CCK LC-39A	Koreasat 5A
45	22	Falcon-9 v1.2	B1035.2	15.12.2017	CC SLC-40	Dragon CRS-13 / TSIS↑ / SDS↑
46	4	Falcon-9 v1.2(ex)	B1036.2	23.12.2017	Va SLC-4E	Iridium-NEXT 116 / 130 / 131 / 134 / 135 / 137 / 138 / 141 / 151 / 153
47	23	Falcon-9 v1.2	B1043.1	08.01.2018	CC SLC-40	ZUMA (USA 280)
48	24	Falcon-9 v1.2	B1032.2	31.01.2018	n CC SLC-40	GovSat 1 (SES 16)
49	1	Falcon-Heavy	B1033.1/23.2/25.2	06.02.2018	r CCK LC-39A	Tesla Roadster
50	5	Falcon-9 v1.2(ex)	B1038.2	22.02.2018	Va SLC-4E	Paz / MicroSat 2a / Microsat 2b

planned launches:

Note: several of the CC launches might launch from CCK or BC

Falcon-9 v1.2	.	xx.xx.2020	CC	AMOS 8
Falcon-9 v1.2	.	xx.xx.2019	CC	AMOS 17
Falcon-Heavy	.	xx.xx.2018	CCK LC-39A	ArabSat 6A
Falcon-9 v1.2	B1046.1	xx.04.2018	CC SLC-40	Bangabandhu 1
Falcon-9 v1.2	B1039.2	xx.04.2018	CC SLC-40	Dragon CRS-14 / RRM3↑ / PFCS↑ / RemoveDEBRIS↑ / DebrisSat 1↑ / DebrisSat 2↑

				Overview 1A
Falcon-9 v1.2	.	xx.06.2018	CC	Dragon CRS-15 / ECOSTRESS ↑ / MISSE-FF 2 ↑
Falcon-9 v1.2	.	xx.11.2018	CC	Dragon CRS-16 / IDA 3 ↑
Falcon-9 v1.2	.	xx.10.2018	CC	Dragon CRS-17 / OCO 3 ↑ / STP-H6 ↑
Falcon-9 v1.2	.	xx.12.2018	CC	Dragon CRS-18 / GEDI ↑
Falcon-9 v1.2	.	xx.05.2019	CC	Dragon CRS-19 / NanoRacks Airlock Module ↑
Falcon-9 v1.2	.	xx.10.2019	CC	Dragon CRS-20 / GEROS-ISS ↑
Falcon-9 v1.2	.	xx.xx.2019	CC	Dragon CRS-21
Falcon-9 v1.2	.	xx.xx.202x	CC	Dragon CRS-22
Falcon-9 v1.2	.	xx.xx.202x	CC	Dragon CRS-23
Falcon-9 v1.2	.	xx.xx.202x	CC	Dragon CRS-24
Falcon-9 v1.2	.	xx.xx.202x	CC	Dragon CRS-25
Falcon-9 v1.2	.	xx.xx.202x	CC	Dragon CRS-26
Falcon-9 v1.2	.	xx.08.2018	CCK LC-39A	Dragon v2 1
Falcon-9 v1.2	.	xx.12.2018	CCK LC-39A	Dragon v2 2
Falcon-9 v1.2	.	xx.xx.201x	CCK LC-39A	Dragon v2 3
Falcon-9 v1.2	.	xx.xx.201x	CCK LC-39A	Dragon v2 4
Falcon-9 v1.2	.	xx.xx.201x	CCK LC-39A	Dragon v2 5
Falcon-9 v1.2	.	xx.xx.201x	CCK LC-39A	Dragon v2 6
Falcon-9 v1.2	.	xx.xx.201x	CCK LC-39A	Dragon v2 7
Falcon-9 v1.2	.	xx.xx.201x	CCK LC-39A	Dragon v2 8
Falcon-9-ATB	.	xx.xx.2018 *	CCK LC-39A	Dragon v2 Abort Test
2 Falcon-Heavy	.	xx.2Q.2018	CCK LC-39A	DSX / FORMOSAT 7A / 7B / 7C / 7D / 7E / 7F / GPIM / OTB 1 / FalconSat 6 / NPSat 1 / Oculus-ASR / Prox 1 / LightSat B / ARMADILLO / FalconSat 7 / TBEX A / TBEX B / Prometheus 2.5 / 2.6 / 2.7 / 2.8 / 2.9 / 2.10 / PSat 2 / BRICSat 2 / TEPCE 1 / TEPCE 2 / CP 9 (LEO) / StangSat / DOTSI / CNC Ballast
Falcon-9 v1.2	.	xx.xx.2018	CC	Es'hail 2
Falcon-9 v1.2	.	xx.xx.20xx	CC	Eutelsat TBD
Falcon-9 v1.2	.	xx.xx.2018	CC	GISAT 1
Falcon-9 v1.2	.	xx.09.2018	CC	GPS-3 1
Falcon-9 v1.2	.	xx.xx.2019	CC	GPS-3 2
Falcon-9 v1.2	B1044.1	xx.03.2018	CC SLC-40	Hispasat 30W-6
Falcon-9 v1.2	.	xx.xx.202x	CC or BC	Inmarsat TBD
Falcon-9 v1.2(ex)	B1041.2	xx.03.2018	Va SLC-4E	140 / 142 / 143 / 144 / 145 / 146 / 148 / 149 / 150 / 157
Falcon-9 v1.2	.	xx.04.2018	Va SLC-4E	Iridium-NEXT xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx
Falcon-9 v1.2	.	xx.xx.2018	Va SLC-4E	Iridium-NEXT xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx
Falcon-9 v1.2	.	xx.xx.2018	Va SLC-4E	Iridium-NEXT xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx / xxx
Falcon-9 v1.2	.	xx.xx.2020	Va SLC-4E	Jason-CS 1 (Sentinel 6A)
Falcon-9 v1.2	.	xx.xx.2019	CC / BC	JCSat 18/kacific 1
Falcon-9 v1.2	.	xx.xx.2020	CC	KPLQ
Falcon-9 v1.2	.	xx.xx.2018	CC	PSN 6 / ?
Falcon-9 v1.2	.	xx.xx.2018	Va SLC-4E	Radarsat Constellation 1 / Radarsat Constellation 2 / Radarsat Constellation 3
Falcon-9 v1.2	.	xx.08.2018	Va SLC-4E	SAOCOM 1A / ITASAT 1
Falcon-9 v1.2	.	xx.xx.2018	Va SLC-4E	SAOCOM 1B / SAOCOM-CS / SARE-1B 1 / SARE-1B 2 / SARE-1B 3 / SARE-1B 4
Falcon-9 v1.2	.	xx.xx.2018	Va SLC-4E	SARah 1
Falcon-9 v1.2	.	xx.xx.2019	Va SLC-4E	SARah 2 / SARah 3
Falcon-9 v1.2	B1040.2	xx.04.2018	CC SLC-40	SES 12
Falcon-9 v1.2	.	xx.xx.2018	Va SLC-4E	SkySat 14 / SkySat 15 / Eu.CROPIS / ORS 6 / STPSat 5 / NEXTSat 1 / KazSTSAT BlackSky Global 1, ..., 4 / HawkEye Pathfinder 1, 2, 3 / Flock-v 1, ..., x / ORS 7A / ORS 7B / COPPER 2 / MinXSS 2 / Audacy Zero / Orbital Reflector / Fox 1C / KNACKSAT / Elysium-Star 2 / JY1-Sat / ?
Falcon-9 v1.2	.	xx.xx.2021	Va SLC-4E	SWOT
Falcon-9 v1.2	.	xx.xx.2019	CC	SXM 7
Falcon-9 v1.2	.	xx.xx.2020	CC	SXM 8
Falcon-9 v1.2	.	xx.05.2018	CC	Telkom 4
Falcon-9 v1.2	.	xx.xx.2018	CC	Telstar 18V (APStar 5C)
Falcon-9 v1.2	.	xx.xx.2018	CC	Telstar 19V
Falcon-9 v1.2	B1045.1	xx.04.2018	CC SLC-40	TESS (MIDEX 7)
Falcon-9 v1.2	.	xx.xx.2020	CC / BC	Turksat 5A
Falcon-9 v1.2	.	xx.xx.2021	CC / BC	Turksat 5B
Falcon-Heavy	.	xx.xx.202x	CCK LC-39A	ViaSat 3-TBD
Falcon-9 v1.2	.	xx.xx.201x	CC	(Bigelow)

† = deployed via [ISS](#) airlock

↑ = non free-flyer payload to be attached to the [ISS](#)

- F failure
- P partial failure
- p partial failure (prime payload in usable orbit)
- r recovery failure (prime mission successful)
- n no recovery attempted (only for recoverable missions)

Failures:

- Flight 4: One engine of stage one failed 80 sec into the flight, but vehicle was able to compensate for a successful primary mission; second burn before secondary payload release took not place
- Flight 9: Stage 1 intentionally not recovered
- Flight 10: Stage 1 intentionally not recovered
- Flight 14: Stage 1 landed hard on recovery attempt
- Flight 15: Stage 1 intentionally not recovered
- Flight 19: Vehicle broke up 2 min 19 sec into the flight due to stage 2 overpressure problem
- Flight 21: Stage 1 landed hard on recovery attempt
- Flight 22: Stage 1 landed hard on recovery attempt
- Flight 26: Stage 1 landed hard on recovery attempt
- Flight 48: Stage 1 intentionally not recovered
- Flight 49: Stage 1 core stage landing failure

Launch sites:

BC = Boca Chica Beach, Boca Chica, Texas, USA
CC = Cape Canaveral Air Force Station, Eastern Test Range, Cape Canaveral, Florida, USA
CCK = NASA John F. Kennedy Space Center, Cape Canaveral, Florida, USA
Va = Vandenberg AFB, California, USA