



Pulse-Width Modulation (PWM) Technology

Benefits of Delta's Advance PWM Control:

- Advance soft switching control (available on certain models)
- Wide PWM frequency input range (30Hz-30kHz)
- Flexible speed control
- Prevent current spikes
- Low switching noise
- Low vibration
- High power efficiency

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Advanced Cooling Solutions Deliver Superior Performance with Greater Efficiency



The PWM Advantage

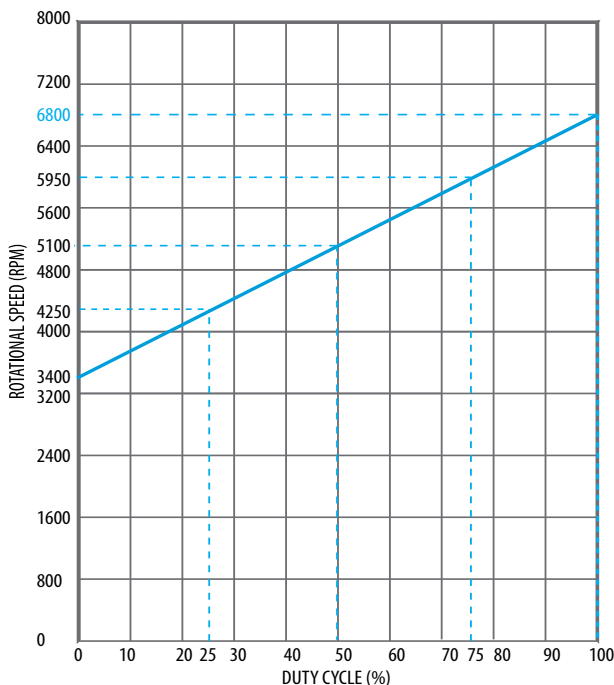
PWM regulates the voltage signal between fully on and fully off, controlling the speed of a fan. The main advantage is that power loss in the switching device is very low. When a switch is off, there is practically no current, and when it is on, there is almost no voltage drop across the switch. Therefore, power loss is close to zero.

PWM Saves Energy and Extends the Life of Delta Fans

Delta's thermal technology continues to provide better performance, high reliability, and cost-effective thermal cooling solutions. PWM is one of the primary reasons Delta fans have a clear advantage over other manufacturers.

Delta carries a full line of PWM speed control fans with dimension ranging from 36x36x28mm up to 280x280x162mm.

PWM Fan Curve – Speed Characteristics



Speed vs PWM Control Signal:

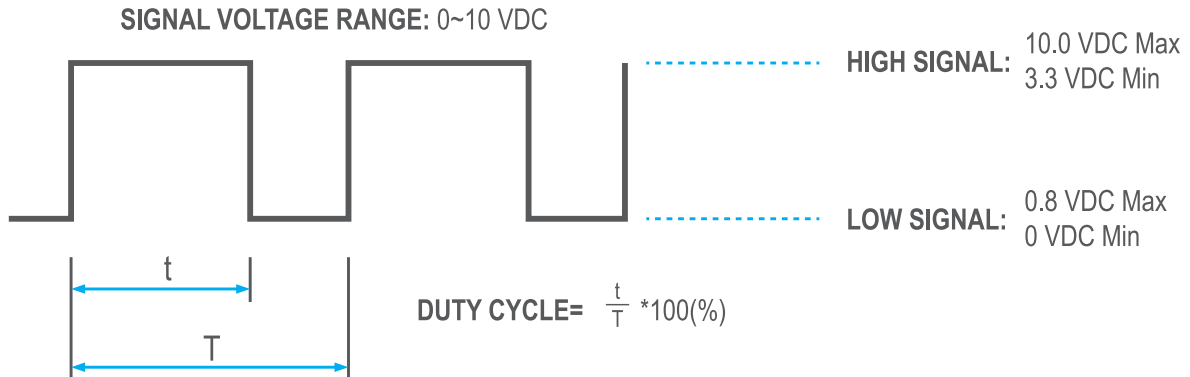
(at rated voltage 48V; PWM signal with 3.3 VDC TTL; Frequency: 2K Hz; Temperature: 25C)

Duty Cycle (%)	Speed (RPM +/-10%)	Current (A)	Noise (dB-A)
100	6800	0.14	46.5
75	5950	0.09	43.5
50	5100	0.06	40.5
25	4250	0.03	36.5
0	3400	0.02	32.0

* Above referenced part number AFB0648EH-TP27

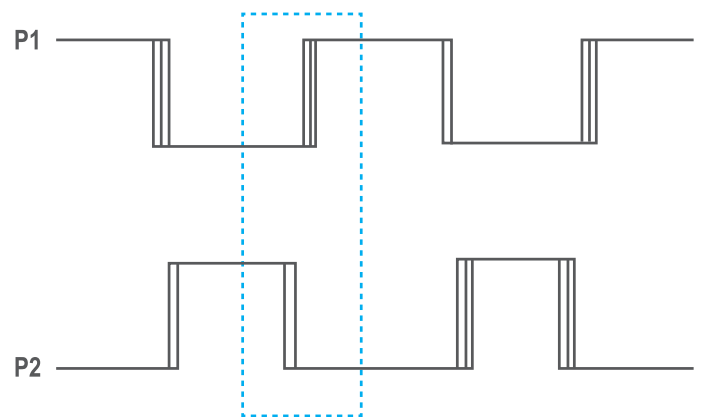
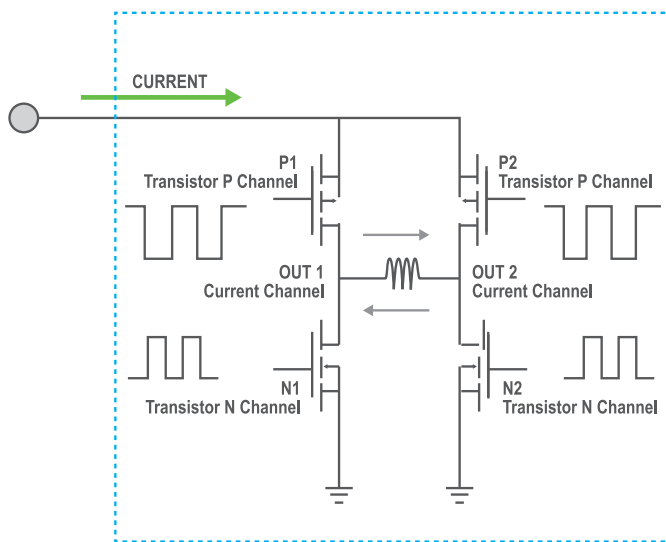
Pulse Width Modulation (PWM) Technology

PWM Input Signal



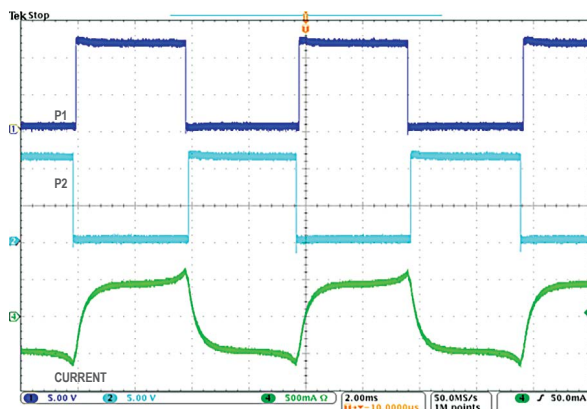
Delta Advance PWM Control

Delta internally developed an advanced PWM circuit control utilizing soft switching to regulate resulting in a smooth current signal to fan, further reducing vibration and noise.

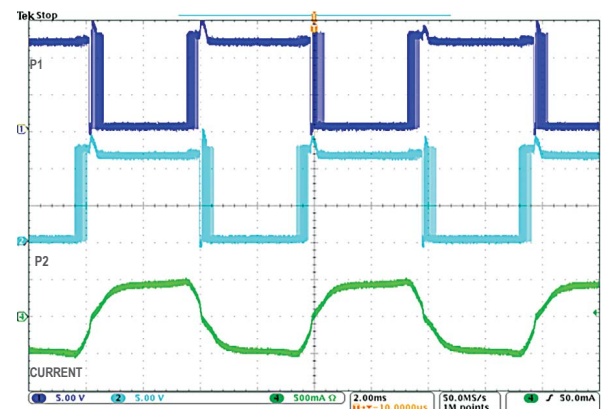


SOFT SWITCHING CONTROL

BEFORE



AFTER



Pulse Width Modulation (PWM) Technology

Part Number	Dimension (mm)	Operating Voltage Range (VDC)	Voltage (VDC)	Bearing Type	Current (A)	Power (W)	Speed (RPM)	Noise (dB-A)	Air Flow (CFM)	Air Pressure (in H ₂ O)
FFB03612EHN-ALB	36x36x28	10.8~13.2	12V	Ball	0.33	3.96	14500	50	16.3	1
FFB03612EHN-BGA	36x36x28	10.8~13.2	12V	Ball	0.39	4.68	14500	50	16.3	1
FFB03812VHN-9C3P	38x38x28	10.8~13.2	12V	Ball	0.55	6.6	16000	58.5	20.23	1.46
FFB03812VN-SPC	38x38x28	10.8~13.2	12V	Ball	0.85	10.2	23000	62.5	23	3.4
GFC03812HG-DV46	38x38x48	10.8~12.6	12V	Ball	1.52	18.24	21700	64	26.42	3.87
AFB0412VHA-DU48	40x40x10	7.0~15.0	12V	Ball	0.09	1.08	8000	33	8.81	0.22
AFB0412SHB-SP04	40x40x15	10.8~13.2	12V	Ball	0.16	1.92	11000	41.5	14.83	0.6
AFB0412VHB-TP25	40x40x15	7.0 ~ 13.0	12V	Ball	0.18	2.16	9500	36.5	13	0.46
AFB0412VHB-TP29	40x40x15	7.0~13.8	12V	Ball	0.18	2.16	9500	36.5	13	0.46
EFB0412VHD-SP05	40x40x20	5.0~13.8	12V	Ball	0.12	1.44	9000	34.5	10.1	0.42
THA0412AD	40x40x20	7.0~15.0	12V	Ball	0.43	5.16	15600	52	20.56	1.38
FFB0412EN-00Y2E	40x40x28	10.8~13.2	12V	Ball	1.45	17.4	25000	64	32.9	4.44
FFB0412GHN-TXQG	40x40x28	5.5~13.2	12V	Ball	0.5	6	16500	56	23.39	1.63
FFB0412SN-00Y2F	40x40x28	10.8~13.2	12V	Ball	0.93	11.16	22000	61.5	29.23	3.46
FFB0412UHN-SP4Z	40x40x28	7.0~13.2	12V	Ball	0.84	10.08	23000	59.9	26.55	3.15
FFB0412VHN-TP03	40x40x28	7 ~13.2	12V	Ball	0.6	1.92	9500	45	15.79	0.51
FFB0424VHN-TZT4	40x40x28	21.6~26.4	24V	Ball	0.1	2.4	9500	45	15.79	0.51
PFB0412EHN-TP06	40x40x28	10.8~13.2	12V	Ball	0.5	6	16000	54.5	21.83	1.43
TFA0412BN-CN	40x40x28	8.0~13.2	12V	Ball	0.42	5.04	15600	50.8	22.2	1.5
TFA0412CN-CN	40x40x28	7.0~13.2	12V	Ball	0.6	7.2	17600	55	25.29	1.87
THA0412BN	40x40x28	7.0~13.2	12V	Ball	0.89	10.68	19000	59	29.52	2.4
GFC0412DG-CMA4	40x40x48	10.8~13.2	12V	Ball	1.4	16.8	15150	64.4	32.35	2.38
GFC0412DS-CMA5	40x40x56	10.8~12.6	12V	Ball	0.85	10.2	17200	64	25.29	2.7
GFC0412DS-DF00	40x40x56	10.8~12.6	12V	Ball	1.3	15.6	16000	64.5	32.18	2.63
GFC0412DS-DU49	40x40x56	10.8~12.6	12V	Ball	1.85	22.2	23000	68.5	35.85	3.98
GFC0412DS-DV17	40x40x56	10.8~13.2	12V	Ball	1.5	18	20500	66	33.22	3.33
GFC0412DS-TP01	40x40x56	5.5~13.2	12V	Ball	1	12	15300	61	30.5	1.73
GFM0412SS-BL4F	40x40x56	10.8~12.6	12V	ball	0.8	9.6	17200	61.5	27.07	2.23
GFM0412SS-DE1PB7Q	40x40x56	10.8~12.6	12V	ball	1.1	12.6	19000	68.5	21.56	3.42
EFB0512HA-TP42	50x50x10	10.8~12.6	12V	Ball	0.1	1.2	5500	30	11.4	0.17
AFB0512HB-TP41	50x50x15	10.8~13.2	12V	Ball	1.2	1.44	6300	34	17.97	0.23
AUC0512DB-AF00	50x50x15	10.8 ~ 13.2	12V	Ball	0.18	2.16	7400	38.5	20.22	0.3
GFM0412SS-DE1PB7Q	40x40x56	10.8~12.6	12V	Ball	1.1	12.6	19000	68.5	21.56	3.42
AFC0612DB-F00	60x60x15	8~13.2	12V	Ball	0.33	3.96	7200	47.5	29.24	0.52
AFB0612VHX03	60x60x25	5.0~13.8	12V	ball	0.2	2.4	5000	40	27.55	0.29
AFB0612DH-TP11	60x60x25	10.8 ~ 13.2	12V	Ball	0.84	10.08	9000	55	50.4	0.93
AFB0624EH-SP50	60x60x25	21.6~26.6	24V	Ball	0.24	5.76	6800	46.5	38.35	0.54
AFB0648EH-TP27	60x60x25	36 ~ 60	48V	Ball	0.14	6.72	6800	46.5	38.35	0.54
AFC0612D-SP07	60x60x25	10.8~13.8	12V	Ball	0.13	1.56	4250	34	23.38	0.21
QFR0612DH-SP00	60x60x25	10.8-13.2	12V	Ball	0.75	9	10600	54.5	51.17	1.02
AFC0612DE-AF00	60x60x38	8~13.2	12V	Ball	1.5	18	12000	61.5	66.75	1.74
FFC0612DE-PP01	60x60x38	7.0~13.2	12V	Ball	0.9	10.8	9000	60	54.79	1.18
PFC0612DE-F00	60x60x38	10.8~13.2	12V	Ball	1.4	16.8	12000	61.5	67.85	2.13
PFM0612XHEB7T	60x60x38	10.8~12.6	12V	Ball	1.15	13.8	18500	65.1	64.44	2.34
PFR0612DHE-SP00	60x60x38	7.0~13.2	12V	Ball	1.6	19.2	14500	63.3	65.98	2.5

Part Number	Dimension (mm)	Operating Voltage Range (VDC)	Voltage (VDC)	Bearing Type	Current (A)	Power (W)	Speed (RPM)	Noise (dB-A)	Air Flow (CFM)	Air Pressure (in H2O)
PFR0612XHE-SP00	60x60x38	7~13.2	12V	Ball	2.3	27.6	16500	67.7	76.16	3.19
THB0648BE	60x60x38	36.0~75.0	48V	Ball	0.34	16.32	14700	61.5	68.6	2.87
GFC0612DS-AQ14	60x60x56	10.8~13.2	12V	Ball	1.6	19.2	10400	66	65.03	2
GFC0624DW-DT48	60x60x76	18.0~26.0	24V	Ball	1.4	31.2	11300	71.5	69.44	3.03
AFC0712DB-F00	70x70x15	8.0~13.2	12V	Ball	0.35	4.2	6000	46.5	41.95	0.33
AFC0712DD-TP10	70x70x20	8 ~ 13.2	12V	Ball	0.35	4.2	5000	44.3	46.86	0.28
AFB0712SHX02	70x70x25	5.0~13.8	12V	Ball	0.65	7.8	6300	50.5	61.05	0.63
EFC0812DB-F00	80x80x15	7~12.6	12V	Ball	0.33	3.96	3800	41	48.8	0.17
AFB0824SHBAV1	80x80x15	14.0~27.6	24V	Ball	0.16	3.84	4000	42.5	42.73	0.22
AUB0812HHDXHN	80x80x20	10.8~12.6	12V	Superflo	0.3	3.6	4500	43	51.46	0.29
AFB0812SH-TP12	80x80x25	10 ~ 13.2	12V	Ball	0.3	3.6	4500	46	55.59	0.38
AUB0812L-9X41	80x80x25	10.8~13.8	12V	superflo	0.09	1.08	2400	25	27.9	0.1
AUB0812VH-SP00	80x80x25	10.8~13.2	12V	Ball	0.19	2.28	3600	39	42.02	0.22
FFB0812XHXHC	80x80x25	7.0~15.0	12V	Ball	1	12	9000	59	92.69	1.1
QFR0812SH-CX13	80x80x25	5.0~13.2	12V	Ball	0.33	3.96	4300	41.2	54.57	0.33
QFR0812UH-CX14	80x80x25	10.8~ 12.6	12V	Ball	0.55	6.6	5600	50.5	70.24	0.55
FFB0848XHA01	80x80x25	32.0~72.0	48V	Ball	0.27	12.96	9000	59	92.69	1.23
FFB0812EHE-SP15	80x80x38	7.0~13.8	12V	Ball	0.75	9	5700	52.5	80.16	0.81
FFC0812DE-F00	80x80x38	7.0~13.2	12V	Ball	1.5	18	7500	62.2	102.02	1.23
PFB0812DHE-TYNT	80x80x38	10.8~13.2	12V	Ball	2.75	33	9000	66	132.6	2.03
PFB0824DHEYDG	80x80x38	12.0~27.6	24V	Ball	1.35	32.4	9000	65	132.56	2.03
PFC0812DE-SP04	80x80x38	10.8~13.2	12V	Ball	2.75	33	9000	65	132.6	2.03
PFM0812HE-01BFY	80x80x38	10.8~12.6	12V	Ball	4.3	51.6	16300	77	129.42	4.97
PFR0812XHE-SP00	80x80x38	9.0~12.6	12V	Ball	3.5	42	13300	71.5	134.29	3
PFR0848XHE-DV82	80x80x38	36.0~56.0	48V	Ball	1	48	13800	73	144.18	3.46
QFR0812UHEYDW	80x80x38	10.8~13.2	12V	Ball	1.15	13.8	9000	60	105.21	1.34
THB0848BEB51	80x80x38	36.0~72.0	48V	Ball	0.7	33.6	15000	70	127.54	4.54
THD0848ME	80x80x38	36.0~75.0	48V	Ball	0.55	26.4	9500	60	128	1.48
GFC0812DS-CMA8	80x80x56	10.8~12.6	12V	Ball	2.17	26.02	12000	72.6	90.12	3.83
GFM0812DS-SMB7R	80x80x56	10.8~12.6	12V	Ball	2.4	28.8	12500	73.3	93.23	4.49
GFC0812DW-TD2G	80x80x76	10.8~12.6	12V	Ball	8.27	99.24	13500	80	177.1	4.5
GFC0812DW-SM00B7P	80x80x80	10.8~12.6	12V	Ball	5.2	62.4	12000	74.5	167.02	4.17
GFC0848DWB74	80x80x80	36.0~60.0	48V	Ball	1.56	74.88	12500	76.5	175	4.47
GFM0812DUB7S	80x80x80	10.8~12.6	12V	Ball	9	1080	13800	82.5	190.63	5.79
AFC0912DB-F00	92x92x15	7.0~13.6	12V	Ball	0.31	3.72	3300	41.5	51.53	0.16
AFC0912D-AF00	92x92x25	8 ~ 13.2	12V	Ball	0.75	9	4800	53	102.59	0.53
AUB0912VH-CX09	92x92x25	10.8~13.2	12V	superflo	0.38	4.56	3800	45	67.8	0.3
FFC0948BY7T	92x92x25	36.0~75.0	48V	Ball	0.17	8.16	3900	49.5	86.4	0.35
QFR0912VH-SP00	92x92x25	10.8~13.2	12V	Ball	0.4	4.8	4200	45	74.78	0.34
AFC0912DE-AF00	92x92x38	10.8~12.6	12V	Ball	2.5	31.2	6000	63	160.22	1
AFC0948DE-TP20	92x92x38	36 ~ 75	48V	Ball	0.6	28.8	7500	67	159.369	1.53
FFB0924EHE-SP20	92x92x38	21.6~26.4	24V	Ball	0.5	12	4800	55	110.18	0.66
FFB0948SHE-TP28	92x92x38	32~56	48V	Ball	0.2	9.6	4400	52.5	100.29	0.57
FFC0912DE-TP04	92x92x38	7.0 ~ 13.2	12V	Ball	0.8	9.6	4800	55	110.18	0.66
PFB0948UHE-TP16	92x92x38	36 ~ 75	48V	Ball	0.52	24.96	7000	64	153.52	1.45
PFR0912XHE-SP00	92x92x38	10.8~12.6	12V	Ball	3.7	44.4	11500	71	185.66	2.55
THA0948BE	92x92x38	30.0~60.0	48V	Ball	1.4	67.2	9500	71	189.67	3.02
THB0948AE	92x92x38	36.0~60.0	48V	Ball	0.76	36.5	13000	72.5	162.5	3.09

Pulse Width Modulation (PWM) Technology

Part Number	Dimension (mm)	Operating Voltage Range (VDC)	Voltage (VDC)	Bearing Type	Current (A)	Power (W)	Speed (RPM)	Noise (dB-A)	Air Flow (CFM)	Air Pressure (in H2O)
THD0948HE-A	92x92x38	36.0~75.0	48V	Ball	1.1	52.8	13500	71	182.41	3.44
THD0948HE-AXHH	92x92x38	36.0~75.0	48V	Ball	1.1	52.8	13500	71	182.41	3.44
AFC1212D-F00	120x120x25	10.2 ~ 13.8	12V	Ball	0.53	6.36	3400	46.5	113.11	0.43
AFC1212D-SP19	120x120x25	10.8~12.6	12V	Ball	0.32	3.84	3000	46	89.7	0.34
AUB1212H-CK15	120x120x25	10.8~13.2	12V	superflo	0.27	3.24	2200	38	88.6	0.16
FFC1212D-F00	120x120x25	7.0~13.2	12V	Ball	1.4	16.8	4000	56.4	150.33	0.49
THB1212B-AXHF	120x120x25	7.0~15.0	12V	Ball	1.6	19.2	5300	59	184.2	0.9
THB1248B-A	120x120x25	36~75	48V	Ball	0.4	19.2	5300	59	186.6	0.96
THB1248B-AXHG	120x120x25	36.0~75.0	48V	Ball	0.4	19.2	5300	59	186.57	0.96
AFB1212HHE-TP02	120x120x38	10.8 ~ 13.2	12V	Ball	0.4	4.8	2900	44	120.07	0.35
AFB1224GHEYNU	120x120x38	21.6~26.4	24V	Ball	1.3	31.2	5200	62	240.96	1.08
AFB1248VHE-T9LN	120x120x38	34~56	48V	Ball	0.31	14.88	4100	55.5	190.48	0.69
AFB1248VHE-TP18	120x120x38	34.0 ~ 56	48V	Ball	0.31	14.88	4100	55.5	190.481	0.69
PFB1248UHE309	120x120x38	36.0~72.0	48V	Ball	1.1	52.8	5500	66.5	252.85	1.41
PFB1248UHE-CN	120x120x38	36.0~72.0	48V	Ball	1.1	52.8	5500	66.5	252.85	1.41
PFB1248UHE-EP	120x120x38	30.0~60.0	48V	Ball	0.88	42.24	5300	66	243.66	1.31
PFB1248XHE-TP17	120x120x38	33 ~ 52.8	48V	Ball	1.6	76.8	7000	72.5	306.92	2.17
PFC1212DE-F00	120x120x38	8~13.2	12V	Ball	4	48	5500	66.5	252.85	1.41
PFC1224DE-6L52	120x120x38	14.0 ~ 25.6	24V	Ball	2	48	5500	66.5	252.85	1.41
PFC1248DE-F00	120x120x38	30~56	48V	Ball	1	48	5500	66.5	252.85	1.41
PFR1212DHE-SP00	120x120x38	8~13.2	12V	Ball	3.7	44.4	7400	68.5	254.35	1.44
PFR1212UHE-SP00	120x120x38	8.0-13.2	12V	Ball	2.7	32.4	6600	65.5	228.65	1.21
QFR1212GHEXUM	120x120x38	8 ~ 13.2	12V	Ball	1.8	21.6	6000	64	210.38	1.17
QFR1224GHEYPR	120x120x38	21.6~26.4	24V	Ball	0.91	21.84	5800	64	195.68	1.03
THA1248BE-AXHE	120x120x38	36.0~60.0	48V	ball	1.68	80.2	9000	72	302.8	3.39
THB1248CE	120x120x38	36.0~60.0	48V	Ball	0.95	45.6	7800	70	262	2.06
THD1248HE	120x120x38	32~59	48V	Ball	2.2	105.82	10900	75	287	4.4
PFM1412DEB7V	140x140x38	10.8~12.8	12V	Ball	3.9	46.8	6500	70	282.31	2.03
THB1448AE	140x140x38	30.0~60.0	48V	Ball	1.1	52.8	6100	66.8	325.9	1.13
EFB1548VHG-TP14	172x150x51	36 ~ 60	48V	Ball	0.49	23.52	4000	60	302.29	0.94
THB1548DG-CN	172x150x51	36.0~72.0	48V	Ball	1.72	82.56	6100	70	427.8	2.29
THB1548DG-CXKQ	172x150x51	24.0~72.0	48V	Ball	1.57	75.36	5800	70	410.51	2.08
EFC1748DG-TP07	172x172x51	28.0 ~ 53	48V	Ball	1.23	59.04	5500	63.4	415.66	1.77
EFC1748DG-TYSG	172x172x51	28.0~53.0	48V	Ball	1.23	59.04	5500	63.4	415.66	1.77
THB1748BG	172x172x51	36.0~56.0	48V	Ball	3.5	168	8000	75	607.07	4.14
THB2048HG-A	200x200x51	36.0~72.0	48V	Ball	4.2	201.6	7700	78	690.3	4.14
THB2048CT	200x200x70	36.0~75.0	48V	Ball	4.8	230	5800	73.6	827.37	2.69
THD2048HT	200x200x70	36.0~75.0	48V	Ball	8	384	7400	78	1026	4.94

Delta PWM Fans Blowers

Part Number	Dimension (mm)	Operating Voltage Range (VDC)	Voltage (VDC)	Bearing Type	Current (A)	Power (W)	Speed (RPM)	Noise (dB-A)	Air Flow (CFM)	Air Pressure (in H2O)
BFB04512HHA-DV52	45x45x10	5.0~13.5	12V	Ball	0.14	1.68	6100	36.0	3.60	0.6
BFB0512HA-CX3D	50x50x10	10.8~13.2	12V	Ball	0.12	1.44	5100	32.5	3.53	0.56
BFB0512VHD-SP01	50x50x20	10.8~12.8	12V	Ball	0.20	2.40	5500	32.0	6.12	0.65
BCB0812UHN-TP09	75x80x30	10.8~12.6	12V	Ball	2.30	27.60	10800	69.3	30.16	3.68
BFB1012HH-TP48	97x94x33	10.8~13.2	12V	Ball	0.69	8.28	3200	53.5	28.33	0.95
TCA1048AB0C	100x100x25	36.0~60.0	48V	Ball	0.39	18.72	6700	65.0	68.67	1.89
TEA1248CS	120x120x54	32.0~60.0	48V	Ball	2.05	98.40	8500	69.2	284.90	2.9
KFB1248EHSB80	120x120x54	36.0~57.0	48V	ball	0.45	21.6	4060	61	174.8	1.35
KFB1724SHT-SP09	175x175x69	21.7~26.4	24V	Ball	2.88	69.12	3300	67.5	334.79	1.89
TCA1748ATXHD	175x175x69	36.0~60.0	48V	Ball	1.6	76.8	4000	70.8	428	1.96

