DELTA ELECTRONICS, INC.
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TAOYUAN HSIEN 333, TAIWAN, R. O. C.

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SPECIFICATION FOR APPROVAL

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Customer:

Description:	DC FAN	
Customer P/N:		REV:
Delta Model NO.:	FFB0412VHN-B	
Sample Rev:	01	Issue NO:
Sample Issue Date:	AUG.04.2005.	Quantity:

1. SCOPE:

THIS SPECIFICATION DEFINES THE ELECTRICAL AND MECHANICAL CHARACTERISTICS OF THE DC BRUSHLESS AXIAL FLOW FAN. THE FAN MOTOR IS WITH TWO PHASES AND FOUR POLES.

2. CHARACTERS:

ITEM	DESCRIPTION
RATED VOLTAGE	12 VDC
OPERATION VOLTAGE	4.5 - 13.2 VDC
START VOLTAGE (ENVIRONMENT TEMPERATURE AT 25°c)	≤4.0 VDC.
INPUT CURRENT	0.16 (MAX. 0..24) A
INPUT POWER	1.92 (MAX. 2.88) W
SPEED	9500 ±8% R.P.M.
MAX. AIR FLOW (AT ZERO STATIC PRESSURE)	0.447 (MIN. 0.402) M^3/MIN. 15.79 (MIN. 14.20) CFM
MAX.AIR PRESSURE (AT ZERO AIR FLOW)	12.94 (MIN. 10.49) mmH_2O 0.509 (MIN. 0.413) $inchH_2O$
ACOUSTICAL NOISE (AVG.)	41.9(MAX. 45.9) dB-A
INSULATION TYPE	UL: CLASS A

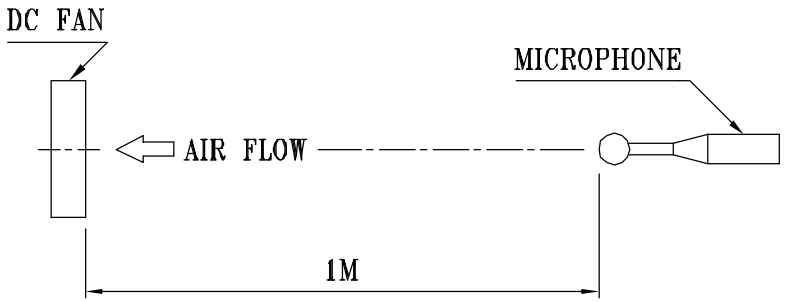
(continued)

PART NO:

DELTA MODEL: FFB0412VHN-B

INSULATION STRENGTH	10 MEG OHM MIN. AT 500 VDC (BETWEEN FRAME AND (+) TERMINAL)
DIELECTRIC STRENGTH	5 mA MAX. AT 500 VAC 60 Hz ONE MINUTE, (BETWEEN FRAME AND (+) TERMINAL)
EXTERNAL COVER	OPEN TYPE
LIFE EXPECTANCE	70,000 HOURS CONTINOUS OPERATION AT 40 °C WITH 15 ~ 65 %RH.
ROTATION	CLOCKWISE VIEW FROM NAME PLATE SIDE
OVER CURRENT SHUT DOWN	THE CURRENT WILL SHUT DOWN, WHEN LOCKING ROTOR.
LEAD WIRE	UL 1007 -F- AWG #24 BLACK WIRE NEGATIVE(-) RED WIRE POSITIVE(+)

NOTES:
1. ALL READINGS ARE MEASURED AFTER STABLY WARMING UP THROUGH 10 MINUTES
2. THE VALUES WRITTEN IN PARENS , ( ), ARE LIMITED SPEC.
3. ACOUSTICAL NOISE MEASURING CONDITION:



NOISE IS MEASURED AT RATED VOLTAGE IN FREE AIR IN ANECHOIC CHAMBER WITH B & K SOUND LEVEL METER WITH MICROPHONE AT A DISTANCE OF ONE METER FROM THE FAN INTAKE.

PART NO:

DELTA MODEL: FFB0412VHN-B

3. MECHANICAL:

3-1. DIMENSIONS ---------- SEE DIMENSIONS DRAWING

3-2. FRAME ---------- PLASTIC UL: 94V-0

3-3. IMPELLER ---------- PLASTIC UL: 94V-0

3-4. BEARING SYSTEM ---------- TWO BALL BEARING

3-5. WEIGHT ---------- 32 GRAMS

4. ENVIRONMENTAL:

4-1. OPERATING TEMPERATURE ---------- -10 TO +70 DEGREE C

4-2. STORAGE TEMPERATURE ---------- -40 TO +75 DEGREE C

4-3. OPERATING HUMIDITY ---------- 5 TO 90 % RH

4-4. STORAGE HUMIDITY ---------- 5 TO 95 % RH

5. PROTECTION:

5-1. LOCKED ROTOR PROTECTION

IMPEDANCE OF MOTOR WINDING PROTECTS MOTOR FROM FIRE IN 96 HOURS OF LOCKED ROTOR CONDITION AT THE RATED VOLTAGE.

5-2. POLARITY PROTECTION

BE CAPABLE OF WITHSTANDING IF REVERSE CONNECTION FOR POSITIVE AND NEGATIVE LEADS.

6. RE OZONE DEPLETING SUBSTANCES:

6-1. NO CONTAINING PBBs, PBBOs, CFCs, PBBEs, PBDPEs AND HCFCs.

7. PRODUCTION LOCATION

7-1. PRODUCTS WILL BE PRODUCED IN CHINA OR THAILAND OR TAIWAN.

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8. BASIC RELIABILITY REQUIREMENT:

8-1. THERMAL CYCLING
LOW TEMPERATURE: -40°C
HIGH TEMPERATURE: +80°C
SOAK TIME: 30 MINUTES
TRANSITION TIME < 5 MINUTES
DUTY CYCLES: 5

8-2. HUMIDITY EXPOSURE
TEMPERATURE: +25°C ~ +65°C
HUMIDITY: 90-98% RH @ +65°C
FOR 4 HOURS/CYCLE
POWER: NON-OPERATING
TEST TIME: 168 HOURS

8-3. VIBRATION
TEMPERATURE: +25°C
ORIENTATION: X, Y, Z
POWER: NON-OPERATING
VIBRATION LEVEL: OVERALL gRMS=3.2

FREQUENCY(Hz)	PSD(G^2/Hz)
10	0.040
20	0.100
40	0.100
800	0.002
1000	0.002

TEST TIME: 2 HOURS ON EACH ORIENTATION

8-4. MECHANICAL SHOCK
TEMPERATURE: +20°C
ORIENTATION: X, Y, Z
POWER: NON-OPERATING
ACCELERATION: 20 G MIN.
PULSE: 11 ms HALF-SINE WAVE
NUMBER OF SHOCKS: 5 SHOCKS
FOR EACH DIRECTION

8-5. LIFE
TEMPERATURE: MAX , OPERATING TEMPERATURE
POWER: OPERATING
DURATION: 1000 HOURS MIN.

PART NO:

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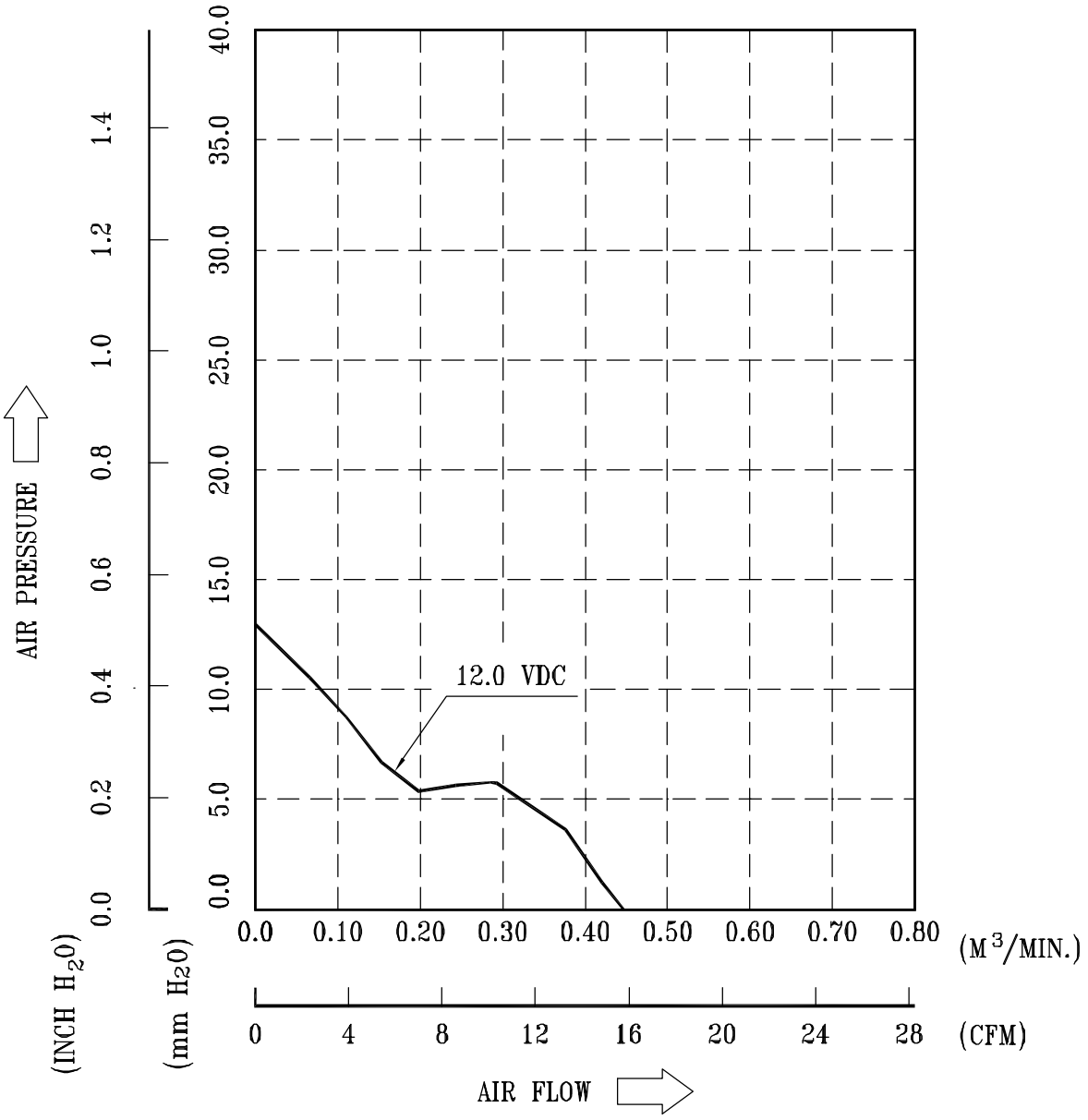
P & Q CURVE:



* TEST CONDITION: INPUT VOLTAGE ----- OPERATION VOLTAGE
TEMPERATURE ------ ROOM TEMPERATURE
HUMIDITY ---------- 65%RH

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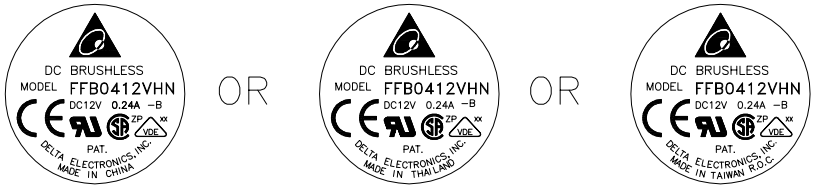
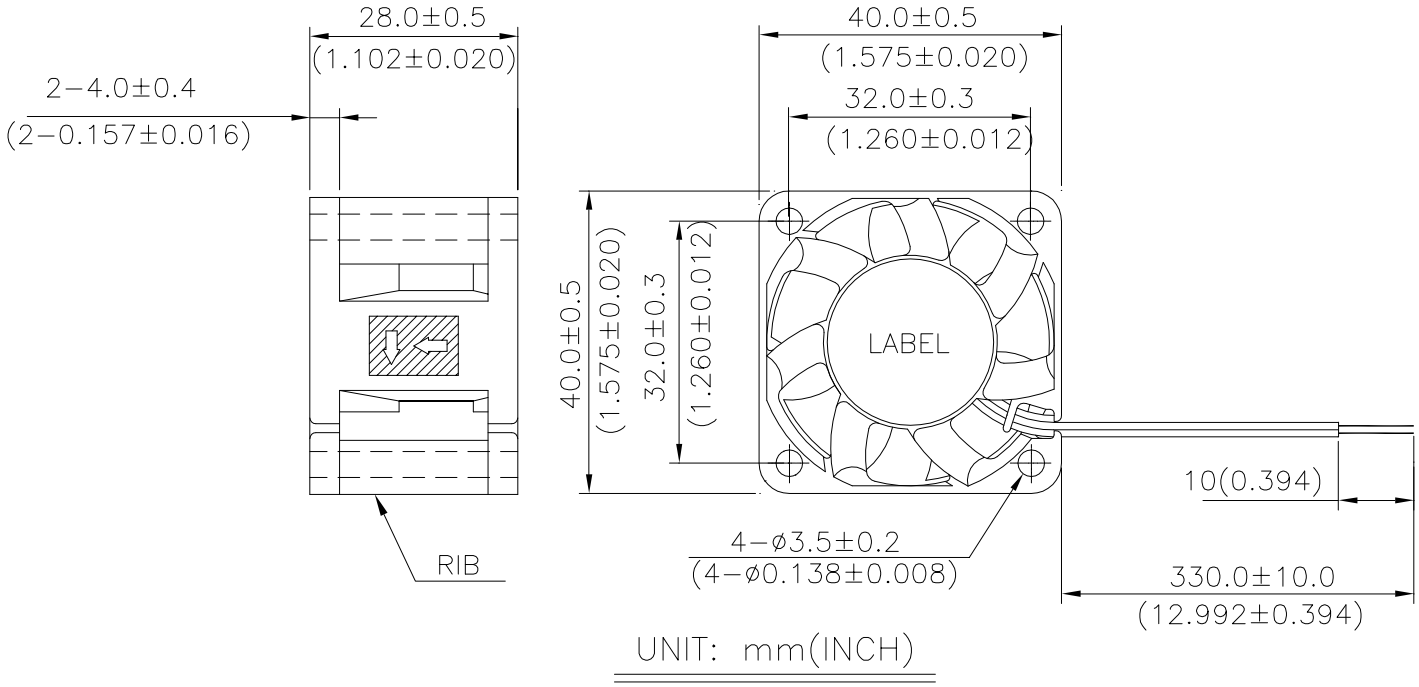
PART NO:

DELTA MODEL: FFB0412VHN-B

Attach: DIMENSIONS DRAWING

LABEL:





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Descriptions:

1. **Delta will not guarantee the performance of the products if the application condition falls outside the parameters set forth in the specification.**

2. **A written request should be submitted to Delta prior to approval if deviation from this specification is required.**

3. **Please exercise caution when handling fans. Damage may be caused when pressure is applied to the impeller, if the fans are handled by the lead wires, or if the fans are hard-dropped to the production floor.**

4. **Except as pertains to some special designs, there is no guarantee that the products will be free from any such safety problems or failures as caused by the introduction of powder, droplets of water or encroachment of insect into the hub.**

5. **The above-mentioned conditions are representative of some unique examples and viewed as the first point of reference prior to all other information.**

6. **It is very important to establish the correct polarity before connecting the fan to the power source. Positive (+) and Negative (-). Damage may be caused to the fans if connection is with reverse polarity, as there is no foolproof method to protect against such error.**

7. **Delta fans are not suitable where any corrosive fluids are introduced to their environment.**

8. **Please ensure all fans are stored according to the storage temperature limits specified. Do not store fans in a high humidity environment. We highly recommend performance testing is conducted before shipping, if the fans have been stored over 6 months.**

9. **Not all fans are provided with the Lock Rotor Protection feature. If you impair the rotation of the impeller for the fans that do not have this function, the performance of those fans will lead to failure.**

10. **Please be cautious when mounting the fan. Incorrect mounting of fans may cause excess resonance, vibration and subsequent noise.**

11. **It is important to consider safety when testing the fans. A suitable fan guard should be fitted to the fan to guard against any potential for personal injury.**

12. **Except where specifically stated, all tests are carried out at relative (ambient) temperature and humidity conditions of 25°C, 65%. The test value is only for fan performance itself.**

13. **Be certain to connect an "over 4.7μF" capacitor to the fan externally when the application calls for using multiple fans in parallel, to avoid any unstable power.**

Model AFB followed by 0505, followed by HD, LD or MD; Model AFB followed by 0512, 0524, followed by HD, HHD, LD, MD or VHD.
Model FUB followed by 0412, 0424, followed by HN, HHN, MN or VHN.
Model KFB followed by 1712, followed by HT, LT or MA; Model KFB followed by 1712, 1724, 1748, followed by HT, LT or MT. .
Model EFB followed by 0805, followed by H, HH, L, LL or M; Model EFB followed by 0812 or 0824, followed by EH, H, HH, L, LL, M, SH or VH; Model EFB followed by 0848, followed by EH, H, HH, L, M, SH or VH.
Models AFB, AUB followed by 0812 or 0824, followed by HD, HHD, LD, LLD, MD, SHD or VHD.
Model EFC followed by 0812 or 0912, followed by A or B.
Models EFB, EUB followed by 0605, followed by HB, HHB, LB or MB; Models EFB, EUB followed by 0612 or 0624, followed by HB, HHB, LB, MB or VHB.
Model FFC followed by 1224, followed by DE; Model FFC followed by 1248, followed by CE or DE; Model FFC followed by 0912 or 0924, followed by DE.
Model FFB followed by 0612 or 0624, followed by EHE, HHE, SHE or VHE.
Model FFB followed by 0412 or 0424, followed by HHN, HN, MN or VHN, may be followed by FOO, ROO or STD.
Model ASB or AUB followed by 0505, followed by HD, LD or MD; Model ASB or AUB followed by 0512 or 0524, followed by HD, HHD, LD, MD or VHD.
Model EFC followed by 0612BA, 0612AA.
Model AFB followed by 0612 or 0624, followed by LC, MC, HC, HHC, VHC; Model AFB followed by 0605, followed by LC, MC, HC; Model AUB or ASB followed by 1212 or 1224, followed by L, M, H, HH, VH, SH; Model EUB or ESB followed by 0912 or 0924, followed by L, M, H, HH, VH.
Model TYF 300.
DC fans, Models X0405Y, X0412Q, where X may be EFB, ESB or EUB, Y may be HA, HHA, LA or MA, and Q may be HA, HHA, LA, MA or VHA.
Models X0405Y, X0412R, Z0424R, X04505LA, X04505MA, X04512LA, X04512MA, X04512HA, where X may be AFB, ASB or AUB, Y may be HB, HHB, LB or MB and R may be HB, HHB, LB, MB, SHB or VHB.
Model 5F175.
Models AFB0712X, AFB0724X, where X may be HC, HHC, LC or MC; Models Y0712Q, Y0724Q, where Y may be AFB, ASB or AUB and Q may be HB, HHB, LB, LLB or MB.
Models HUB0705Y, HUB0712Q, HUB0724Q, HUB0805Y, HUB0812Q, HUB0824Q, where Y may be H, L or M and Q may be H, HH, L or M.
Models AFC1212Y, AFC1224Y, AFC1248Y, where Y may be AE, BE or DE.
Models AFB0605(X)C, AFB06(Y)(Z)C, where(X) may be L, M, H, (Y) may be 12, 24 and (Z) may be L, M, H, HH, VH.
Models AUB12(X)(Y), ASB12(X)(Y), where (X) may be 12 or 24 and (Y) may be L, M, H, HH, VH.
Models X0405Y, X0412Q, X0424Q, where X may be GFB, GSB or GUB, Y may be HF, HHF or MF and Q may be HF, HHF, MF or VHF. May be suffixed with alphanumeric characters.
Models Q0812CG, Q0824CG, X0812Y, X0824Y, where X may be GSB, GFB or GUB, Y may be HHG, SHG or VHG and Q may be GFC, GSC or GUC.
Models EFC0924A, EFC0924B, EFB0912HH, EFB0912VH, EFB0912SH, EFB0924HH, EFB0924VH, EFB0948HH, EFB0948VH.
Model BFC0848D.
Model (X)09(Y)(Z), where (X) may be AFB, AUB or ASB, (Y) may be 12 or 24 and (Z) may be LD, MD, HD, HHD or VHD.
Model EFC1748DG-S41P.
Model EFC1748DG-XXXX, where XXXX may be 0 through 9 or a through z
Models FFB1212(X)H, FFB1224(X)H, FFB1248(X)H, where (X) may be H, V, S or E.
Models AFB0712(X)D, AFB0724(X)D, where (X) may be H, HH or VH.
Models GFB0412SHE, GFB0612(X)HG, GFB0624(Y)HG, GFB0912(X)HG, GFB0924(Y)HG, GFB0948(Y)HG, where (X) may be H, V or S and (Y) may be H or V.
Models FFB1424(X)HG, FFB1448(X)HG, where (X) may be H, V or S.
Models GFB0412SHE, GFB0612(X)HG, GFB0624(Y)HG, GFB0912(X)HG, GFB0924(Y)HG, GFB0948(Y)HG, where (X) may be H, V or S and (Y) may be H or V.
Models BFB05512(X)A, KFB0412HA-S12W, where (X) may be HH, H or M.
Models FFC0848CE and FFC0912CE.
Models EFC12(X)DF, EFC12(X)D, AFC12(X)D where (X) may be 12, 24 or 48.
Models EFB08(X)(Y)B where (X) may be 12 or 24; (Y) may be HH, H, M or L.
Models KFB1748HHT, KFB1348(X)T, where (X) may be H, M or L.
Models FFC0848CE, FFC0912CE.
Models EFC12(X)DF, EFC12(X)D, AFC12(X)D, where (X) may be 12, 24 or 48.
Model EFB08(X)(Y)B, where (X) may be 12 or 24 and (Y) may be HH, H, M or L.
Marking: Company name and model designation.

See General Information Preceding These Recognitions
For use only in equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc.

DELTA ELECTRONICS, INC.

Statement of Compliance

Project No: LR 91949C - 52
Date: Jan. 15, 2002

Issued from: Delta Electronics, Inc.
Address: No. 31-1, Shien Pam Road, Kuei Shan Ind. Zone, Taoyuan, Taiwan, R.O.C.

Subject: Components DC Fans FFB0412/24MN/HN/HHN/VHN
(Optional suffixes "STD", "R00", "F00" may be added)

The subject equipment has been evaluated in accordance with CSA's Category Certification program and has been found to comply with the following requirements.

C22.2 No. 0-M91 – General Requirements – Canadian Electronical Code, Part II
CSA Standard C22.2 No. 113-M1984 – Fan and Ventilators
Technical Information Letter G-37B

By the authority of CSA, this equipment is immediately to bear the CSA mark.

In accordance with the Category Certification Procedure, the evaluation and testing of this equipment is subject to final validation by CSA.

Issued by:

Roger Lu

Roger Lu
Safety Engineer
CPBG QE

cc: CSA Pacific/Central/Easten Region Office

D:\ccpfan\state-compliance\ffb04xn

Name und Sitz des Genehmigungs-Inhabers / *Name and registered seat of the Licence holder*
Delta Electronics Inc., 186 Ruey Kuang Road, NEIHU TAIPEI (114), TAIWAN

Aktenzeichen / *File ref.*
1164100-2611-0003 / 31147 / F131 / DO

letzte Änderung / *updated* 2003-05-28

Datum / *Date* 2000-05-26

Dieses Blatt gilt nur in Verbindung mit Blatt 1 des Gutachtens mit Fertigungsüberwachung Nr. 128374.
This supplement is only valid in conjunction with page 1 of the Certificate of Conformity with factory surveillance No. 128374.

GUB0405MF/HF/HHF	**DC 5V**
GFB0412MF/HF/HHF/VHF	**DC 12V**
GSB0412MF/HF/HHF/VHF	**DC 12V**
GUB0412MF/HF/HHF/VHF	**DC 12V**
GFB0424MF/HF/HHF/VHF	**DC 24V**
GSB0424MF/HF/HHF/VHF	**DC 24V**
GUB0424MF/HF/HHF/VHF	**DC 24V**
FFB0412MN/HN/HHN/VHN	**DC 12V**
FFB0424MN/HN/HHN/VHN	**DC 24V**
GFB1212MW/HW/HHW/VHW	**DC 12V**
GFB1224MW/HW/HHW/VHW	**DC 24V**
GFB1248MW/HW/HHW/VHW	**DC 48V**
GFC1212CW	**DC 12V**
GFC1224CW	**DC 24V**
GFC1248CW	**DC 48V**
GFB0812HHG/VHG/SVG	**DC 12V**
GFB0824HHG/VHG/SVG	**DC 24V**
GUB0812HHG/VHG/SVG	**DC 12V**
GUB0824HHG/VHG/SVG	**DC 24V**
GSB0812HHG/VHG/SVG	**DC12V**
GSB0824HHG/VHG/SVG	**DC 24V**
GFC0812CG	**DC 12V**
GFC0824CG	**DC 24V**
GUC0812CG	**DC 12V**
GUC0824CG	**DC 24V**
GSC0812CG	**DC 12V**
GSC0824CG	**DC 24V**
EFC0912BF	**DC 12V**
EFC0924AE/BE	**DC 24V**
BFB1048LL/L/M/H	**DC 48V**
KFB0112H	**DC 12V**
FFC0924A/B	**DC 24 V**
EFB1512LE/ME/HE	**DC 12 V**
EFB1524LE/ME/HE	**DC 24 V**
EFB1548LE/ME/HE	**DC 48 V**
FFB0912HH/VH/SH	**DC 12V**
FFB0924HH/VH	**DC 24V**
FFB0948HH/VH	**DC 48V**
AFB0912LD/MD/HD/HHD/VHD	**DC 12V**
AUB0912LD/MD/HD/HHD/VHD	**DC 12V**
ASB0912LD/MD/HD/HHD/VHD	**DC 12V**

Fortsetzung siehe Blatt 6 /
continued on page 6