

## 蛍光表示管製品規格 VACUUM FLUORESCENT DISPLAY SPECIFICATION

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双葉電子工業株式会社

電子部品事業部 電子管技術グループ  
ENGINEERING GROUP, ELECTRON TUBE  
ELECTRONIC COMPONENTS DIVISION  
FUTABA CORPORATION

形名 Type No. GP1204AI

用途 : Application コンパス(64×128dot, 0.43Pitch)  
外形寸法 : Outer Dimension 85.0 (L) × 42.0 (W) × 7.6 (T)mm  
Lead Free Solder  
発光色 : Color of Illumination Green

### 絶対最大定格: Absolute Maximum Rating

| 項目         | Item                  | Symbol           | Terminals     | Rating         | Unit |
|------------|-----------------------|------------------|---------------|----------------|------|
| フィラメント電圧   | Filament Voltage      | *1 Ef            | F+ - F-       | 2.8            | Vdc  |
| ロジック電源電圧   | Logic Supply Voltage  | *3,*4 VDD        | VDD           | -0.3 ~ 6.0     | Vdc  |
| ドライバ電源電圧   | Driver Supply Voltage | *3 VH            | VH            | -0.3 ~ 58      | Vdc  |
| ロジック信号入力電圧 | Logic Input Voltage   | VIN              | SI,CLK,LAT;BK | -0.3 ~ VDD+0.3 | Vdc  |
| 保存温度       | Storage Temperature   | T <sub>stg</sub> | -             | -55 ~ +85      | °C   |

絶対最大定格: 瞬時たりとも超えてはならない規格であり、これを超えた場合恒久的な機能障害を発生する可能性があります。  
Absolute Maximum Condition: The value shall not be exceeded in any conditions. Permanent damage to VFD may be expected.

### 推奨動作条件: Recommended Operating Condition

| 項目         | Item                  | Symbol             | Min.    | Typ.    | Max.    | Unit |
|------------|-----------------------|--------------------|---------|---------|---------|------|
| フィラメント電圧   | Filament Voltage      | *1 Ef              | 2.12    | 2.35    | 2.59    | Vdc  |
| ドライバ電源電圧   | Driver Supply Voltage | *3 VH              | 43      | 48      | 53      | Vdc  |
| ロジック電源電圧   | Logic Supply Voltage  | *3 VDD             | 3.0     | 3.3     | 3.6     | Vdc  |
| Hレベル入力電圧   | H-Level Input Voltage | V <sub>IH</sub>    | VDD×0.8 | -       | VDD     | Vdc  |
| Lレベル入力電圧   | L-Level Input Voltage | V <sub>IL</sub>    | 0       | -       | VDD×0.2 | Vdc  |
| カットオフバイアス  | Cut-off Bias          | *2 Ek              | 3.0     | -       | 4.5     | Vdc  |
| デューティファクタ  | Duty Factor           | Du                 | -       | 1/ 46.3 | -       | -    |
| パルス幅       | Pulse Width           | tp                 | -       | 95      | -       | μs   |
| ブランク幅      | Blanking Width        | t <sub>blank</sub> | 5       | -       | -       | μs   |
| ソフトクロック周波数 | Shift Clock Frequency | f <sub>CLK</sub>   | -       | -       | 5       | MHz  |
| 動作温度       | Operating Temperature | T <sub>opr</sub>   | -40     | -       | +85     | °C   |

推奨動作条件: 信頼性、品質を確保できる範囲(寿命はTyp.値が最適値です。)

Recommended Operating Condition: Quality and reliability can be assured in this condition.  
(Typ. condition is the most optimized value on the life time.)

\*1 AC50, 60Hzまたは30kHz以上の実効値。50Hz, 60Hz or > 30kHz r.m.s.

\*2 フィラメントトランスのセンタータップに印加する。Ek is applied to the center tap of the filament transformer.

\*3 電源シーケンス Power Supply Sequence

VHを印加中はVDDを3.0~3.6Vの間でご使用下さい。

VDD should be 3.0 to 3.6V when applying VH.

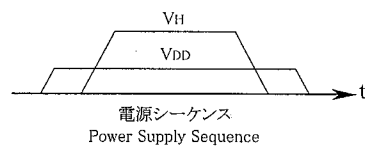
電源投入時はVDDとVHを同時、またはVDDを投入した後にVHを投入下さい。

VH and VDD should be on at the same, or VH should be on after VDD is on.

電源遮断時はVDDとVHを同時、またはVHを遮断した後にVDDを遮断下さい。

VH and VDD should be off at the same, or VDD should be off after VH is off.

\*4 VHを印加中は推奨動作条件でご使用下さい。Recommended Operating Condition should be used when applying VH.



本製品は半導体製品ですので静電気のお取り扱いには十分ご注意ください。

The VFD is built with C-MOS Ics. Precautions should be taken to minimize the possibility of static charges.

本規格と異なる使い方をされる場合、品質、信頼性を確保出来ない場合がありますので事前にご相談下さい。

Since deviation from this specification may generate quality or reliability concerns, please consult to FUTABA prior to use.

この仕様書の内容はお断りなく変更することがありますのでご了承下さい。

This specification is subject to change without notice.

# 電気的特性:Electrical Characteristics

指定がない場合は、推奨動作条件のTyp値、全点灯、 $f_{CLK}=5\text{MHz}$ 、 $\text{PGND}=\text{LGND}=0\text{V}$ とする。

Unless otherwise specified, The test condition should be Typ value of recommended condition and all segments on,  $f_{CLK}=5\text{MHz}$ ,  $\text{PGND}=\text{LGND}=0\text{V}$ .

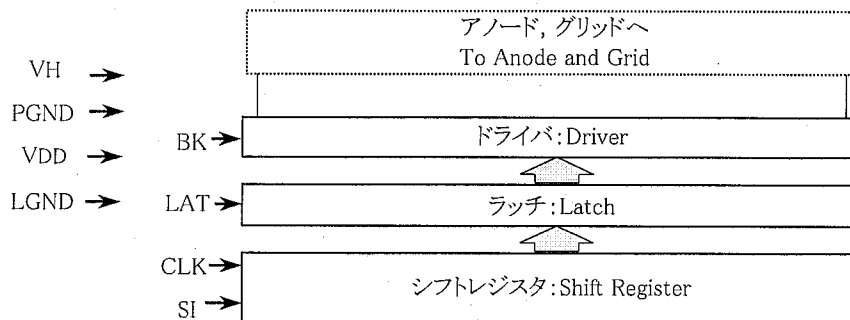
| 項目 : Item                                | Test Condition                                 |                | Symbol                    | Min. | Typ. | Max. | Unit.                  |
|--|--|----------------|---------------------------|------|------|------|------------------------|
| フィラメント電流<br>Filament Current             | $E_f = 2.35 \text{ Vdc}$<br>$V_H = V_{DD} = 0$ |                | $I_f$                     | 430  | 478  | 502  | $\text{mA}_{dc}$       |
| ロジック電源電流<br>Logic Supply Current         | $f_{CLK} = 5\text{MHz}$                        |                | $I_{DD}$                  | —    | —    | 5.0  | $\text{mA}$            |
| ドライバ電源電流<br>Driver Supply Current        | 全点灯<br>All Segments on                         |                | $I_{H(AVG)}$              | —    | 14   | 24   | $\text{mA}$            |
|  |  |                | $I_{H(PEAK)}$             | —    | 14   | 24   | $\text{mA}$            |
| Hレベル入力電流<br>H-Level Input Current        | $V_{IN} = V_{DD}$                              |                | $I_{IH}$                  | —    | —    | 5    | $\mu\text{A}$          |
| Lレベル入力電流<br>L-Level Input Current        | $V_{IN} = 0\text{V}$                           | SI, CLK<br>LAT | $I_{IL}$                  | —    | —    | —5   | $\mu\text{A}$          |
|  |  | BK             |                           | —35  | —50  | —400 |                        |
| 輝度<br>Luminance                          | $E_f = 2.35 \text{ Vdc}$                       |                | L( G. )                   | 500  | 1000 | —    | $\text{cd}/\text{m}^2$ |
|  | $V_{DD} = 3.3 \text{ Vdc}$                     |                |                           |      |      |      |                        |
|  | $V_H = 48 \text{ Vdc}$                         |                |                           |      |      |      |                        |
|  | $*(E_k = 3.0 \text{ Vdc})$                     |                |                           |      |      |      |                        |
|  | Duty = 1/46.3                                  |                |                           |      |      |      |                        |
|  | $t_p = 95 \mu\text{s}$                         |                |                           |      |      |      |                        |
|  | $t_{blank} = 5 \mu\text{s}$                    |                |                           |      |      |      |                        |
|  |  |                |                           |      |      |      |                        |
| 輝度比<br>Luminance Ratio<br>between Digits |  |                | $\frac{L_{max}}{L_{min}}$ | —    | —    | 2    |                        |

形名 Type No. GP1204AI

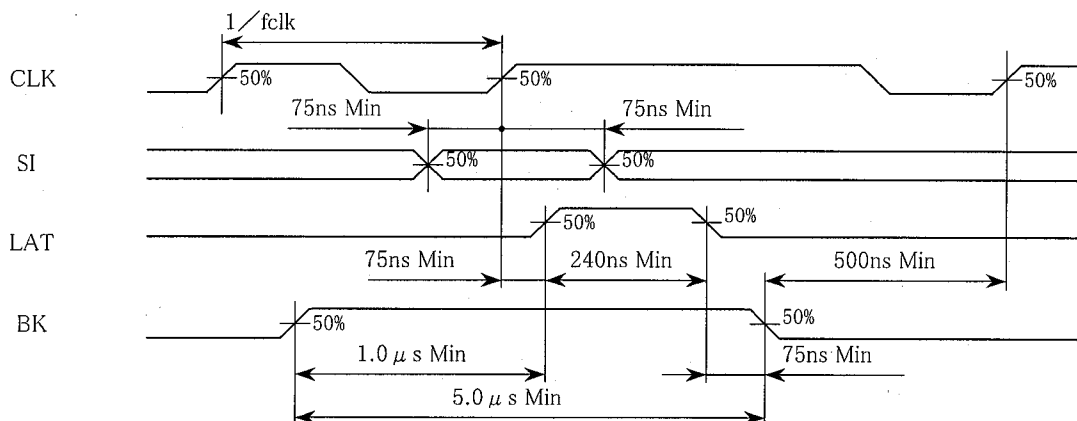
機能表:Function Table

| 機能<br>Function                         | 記号<br>Symbol | 入力/出力<br>Input/Output | 内容<br>Description   |
|--|--------------|-----------------------|---|
| シフトレジスタクロック<br>Shift Register Clock    | CLKA<br>CLKG | 入力<br>Input           | ↑: データシフト<br>↑: Data Shift                                    |
| シリアルデータ入力<br>Serial Data Input         | SIA<br>SIG   | 入力<br>Input           | タイミングチャートを参照<br>See Timing Chart                              |
| ラッチコントロール入力<br>Latch Control Input     | LATA<br>LATG | 入力<br>Input           | H: データスルー ↓: データラッチ<br>H: Data through ↓: Data latch          |
| ドライバ出力ブランキング<br>Driver Output Blanking | BKA<br>BKG   | 入力<br>Input           | L: 出力オン H or Open: 出力オフ<br>L: Output ON H or Open: Output OFF |
| シリアルデータ出力<br>Serial Data Output        | SOA<br>SOG   | 出力<br>Output          | オープンにしてください。<br>To be open on the PCB                         |
| ロジック電源端子<br>Logic Supply Pin           | VDD          | 入力<br>Input           | ロジック回路のための電源端子<br>Power Supply pin for Logic Circuit          |
| ドライバ電源端子<br>Driver Supply Pin          | VHA<br>VHG   | 入力<br>Input           | ドライバのための電源端子<br>Power Supply pin for Driver Output            |
| ロジックグランド端子<br>Logic GND Pin            | LGND         | 入力<br>Input           | ロジックのグランド<br>GND for Logic Circuit                            |
| パワーグランド端子<br>Power GND Pin             | PGND         | 入力<br>Input           | VHのグランド<br>GND for VH Circuit                                 |
| フィラメント端子<br>Filament Pin               | F+,F-        | 入力<br>Input           | フィラメント電圧入力端子<br>Filament Voltage input                        |
| ノーピン<br>No Pin                         | NP           | —                     | NP部にはピンはありません。<br>There is no pin.                            |

ドライバICのブロック図 : Block Diagram for the Driver IC



AC特性 : AC Characteristics



注1). 入力信号変化時間は50ns Maxとして下さい。

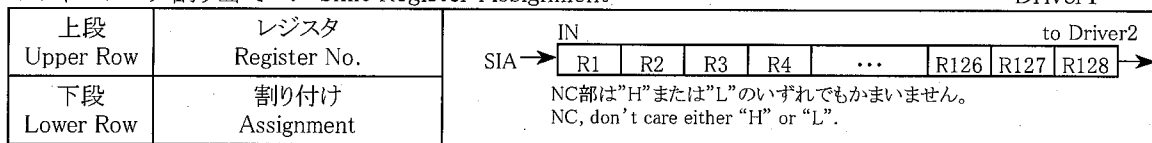
Note1.) Rise/Fall time of Logic input signals should be set to 50nsec Max.

形名 Type No. GP1204AI

アノードドライバ : Anode Driver

シフトレジスタ割り当て : Shift Register Assignment

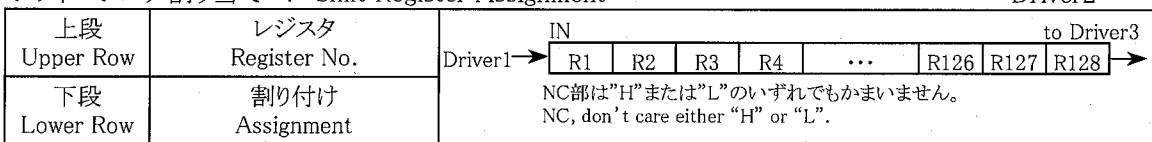
Driver1



|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| R1   | R2   | R3   | R4   | R5   | R6   | R7   | R8   | R9   | R10  | R11  | R12  | R13  | R14  | R15  | R16  |
| C1   | B1   | D1   | A1   | E1   | F1   | C2   | B2   | D2   | A2   | E2   | F2   | C3   | B3   | D3   | A3   |
| R17  | R18  | R19  | R20  | R21  | R22  | R23  | R24  | R25  | R26  | R27  | R28  | R29  | R30  | R31  | R32  |
| E3   | F3   | C4   | B4   | D4   | A4   | E4   | F4   | C5   | B5   | D5   | A5   | E5   | F5   | C6   | B6   |
| R33  | R34  | R35  | R36  | R37  | R38  | R39  | R40  | R41  | R42  | R43  | R44  | R45  | R46  | R47  | R48  |
| D6   | A6   | E6   | F6   | C7   | B7   | D7   | A7   | E7   | F7   | C8   | B8   | D8   | A8   | E8   | F8   |
| R49  | R50  | R51  | R52  | R53  | R54  | R55  | R56  | R57  | R58  | R59  | R60  | R61  | R62  | R63  | R64  |
| C9   | B9   | D9   | A9   | E9   | F9   | C10  | B10  | D10  | A10  | E10  | F10  | C11  | B11  | D11  | A11  |
| R65  | R66  | R67  | R68  | R69  | R70  | R71  | R72  | R73  | R74  | R75  | R76  | R77  | R78  | R79  | R80  |
| E11  | F11  | C12  | B12  | D12  | A12  | E12  | F12  | C13  | B13  | D13  | A13  | E13  | F13  | C14  | B14  |
| R81  | R82  | R83  | R84  | R85  | R86  | R87  | R88  | R89  | R90  | R91  | R92  | R93  | R94  | R95  | R96  |
| D14  | A14  | E14  | F14  | C15  | B15  | D15  | A15  | E15  | F15  | C16  | B16  | D16  | A16  | E16  | F16  |
| R97  | R98  | R99  | R100 | R101 | R102 | R103 | R104 | R105 | R106 | R107 | R108 | R109 | R110 | R111 | R112 |
| C17  | B17  | D17  | A17  | E17  | F17  | C18  | B18  | D18  | A18  | E18  | F18  | C19  | B19  | D19  | A19  |
| R113 | R114 | R115 | R116 | R117 | R118 | R119 | R120 | R121 | R122 | R123 | R124 | R125 | R126 | R127 | R128 |
| E19  | F19  | C20  | B20  | D20  | A20  | E20  | F20  | C21  | B21  | D21  | A21  | E21  | F21  | C22  | B22  |

シフトレジスタ割り当て : Shift Register Assignment

Driver2



|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| R1   | R2   | R3   | R4   | R5   | R6   | R7   | R8   | R9   | R10  | R11  | R12  | R13  | R14  | R15  | R16  |
| D22  | A22  | E22  | F22  | C23  | B23  | D23  | A23  | E23  | F23  | C24  | B24  | D24  | A24  | E24  | F24  |
| R17  | R18  | R19  | R20  | R21  | R22  | R23  | R24  | R25  | R26  | R27  | R28  | R29  | R30  | R31  | R32  |
| C25  | B25  | D25  | A25  | E25  | F25  | C26  | B26  | D26  | A26  | E26  | F26  | C27  | B27  | D27  | A27  |
| R33  | R34  | R35  | R36  | R37  | R38  | R39  | R40  | R41  | R42  | R43  | R44  | R45  | R46  | R47  | R48  |
| E27  | F27  | C28  | B28  | D28  | A28  | E28  | F28  | C29  | B29  | D29  | A29  | E29  | F29  | C30  | B30  |
| R49  | R50  | R51  | R52  | R53  | R54  | R55  | R56  | R57  | R58  | R59  | R60  | R61  | R62  | R63  | R64  |
| D30  | A30  | E30  | F30  | C31  | B31  | D31  | A31  | E31  | F31  | C32  | B32  | D32  | A32  | E32  | F32  |
| R65  | R66  | R67  | R68  | R69  | R70  | R71  | R72  | R73  | R74  | R75  | R76  | R77  | R78  | R79  | R80  |
| C33  | B33  | D33  | A33  | E33  | F33  | C34  | B34  | D34  | A34  | E34  | F34  | C35  | B35  | D35  | A35  |
| R81  | R82  | R83  | R84  | R85  | R86  | R87  | R88  | R89  | R90  | R91  | R92  | R93  | R94  | R95  | R96  |
| E35  | F35  | C36  | B36  | D36  | A36  | E36  | F36  | C37  | B37  | D37  | A37  | E37  | F37  | C38  | B38  |
| R97  | R98  | R99  | R100 | R101 | R102 | R103 | R104 | R105 | R106 | R107 | R108 | R109 | R110 | R111 | R112 |
| D38  | A38  | E38  | F38  | C39  | B39  | D39  | A39  | E39  | F39  | C40  | B40  | D40  | A40  | E40  | F40  |
| R113 | R114 | R115 | R116 | R117 | R118 | R119 | R120 | R121 | R122 | R123 | R124 | R125 | R126 | R127 | R128 |
| C41  | B41  | D41  | A41  | E41  | F41  | C42  | B42  | D42  | A42  | E42  | F42  | C43  | B43  | D43  | A43  |

型名 Type No. GP1204AI

アノード・グリッドドライバ : Anode & Grid Driver

シフトレジスタ割り当て : Shift Register Assignment

Driver3

|                 |                      |  |    |    |     |      |      |      |      |      |
|-----------------|----------------------|--|----|----|-----|------|------|------|------|------|
| 上段<br>Upper Row | レジスタ<br>Register No. | IN<br>Driver2 → <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td><td>...</td><td>R126</td><td>R127</td><td>R128</td> </tr> </table> OUT<br>NC部は“H”または“L”のいずれでもかまいません。<br>NC, don't care either "H" or "L". | R1 | R2 | R3  | R4   | ...  | R126 | R127 | R128 |
| R1              | R2                   |  | R3 | R4 | ... | R126 | R127 | R128 |      |      |
| 下段<br>Lower Row | 割り付け<br>Assignment   |  |    |    |     |      |      |      |      |      |

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| R1   | R2   | R3   | R4   | R5   | R6   | R7   | R8   | R9   | R10  | R11  | R12  | R13  | R14  | R15  | R16  |
| E43  | F43  | C44  | B44  | D44  | A44  | E44  | F44  | C45  | B45  | D45  | A45  | E45  | F45  | C46  | B46  |
| R17  | R18  | R19  | R20  | R21  | R22  | R23  | R24  | R25  | R26  | R27  | R28  | R29  | R30  | R31  | R32  |
| D46  | A46  | E46  | F46  | C47  | B47  | D47  | A47  | E47  | F47  | C48  | B48  | D48  | A48  | E48  | F48  |
| R33  | R34  | R35  | R36  | R37  | R38  | R39  | R40  | R41  | R42  | R43  | R44  | R45  | R46  | R47  | R48  |
| C49  | B49  | D49  | A49  | E49  | F49  | C50  | B50  | D50  | A50  | E50  | F50  | C51  | B51  | D51  | A51  |
| R49  | R50  | R51  | R52  | R53  | R54  | R55  | R56  | R57  | R58  | R59  | R60  | R61  | R62  | R63  | R64  |
| E51  | F51  | C52  | B52  | D52  | A52  | E52  | F52  | C53  | B53  | D53  | A53  | E53  | F53  | C54  | B54  |
| R65  | R66  | R67  | R68  | R69  | R70  | R71  | R72  | R73  | R74  | R75  | R76  | R77  | R78  | R79  | R80  |
| D54  | A54  | E54  | F54  | C55  | B55  | D55  | A55  | E55  | F55  | C56  | B56  | D56  | A56  | E56  | F56  |
| R81  | R82  | R83  | R84  | R85  | R86  | R87  | R88  | R89  | R90  | R91  | R92  | R93  | R94  | R95  | R96  |
| C57  | B57  | D57  | A57  | E57  | F57  | C58  | B58  | D58  | A58  | E58  | F58  | C59  | B59  | D59  | A59  |
| R97  | R98  | R99  | R100 | R101 | R102 | R103 | R104 | R105 | R106 | R107 | R108 | R109 | R110 | R111 | R112 |
| E59  | F59  | C60  | B60  | D60  | A60  | E60  | F60  | C61  | B61  | D61  | A61  | E61  | F61  | C62  | B62  |
| R113 | R114 | R115 | R116 | R117 | R118 | R119 | R120 | R121 | R122 | R123 | R124 | R125 | R126 | R127 | R128 |
| D62  | A62  | E62  | F62  | C63  | B63  | D63  | A63  | E63  | F63  | C64  | B64  | D64  | A64  | E64  | F64  |

シフトレジスタ割り当て : Shift Register Assignment

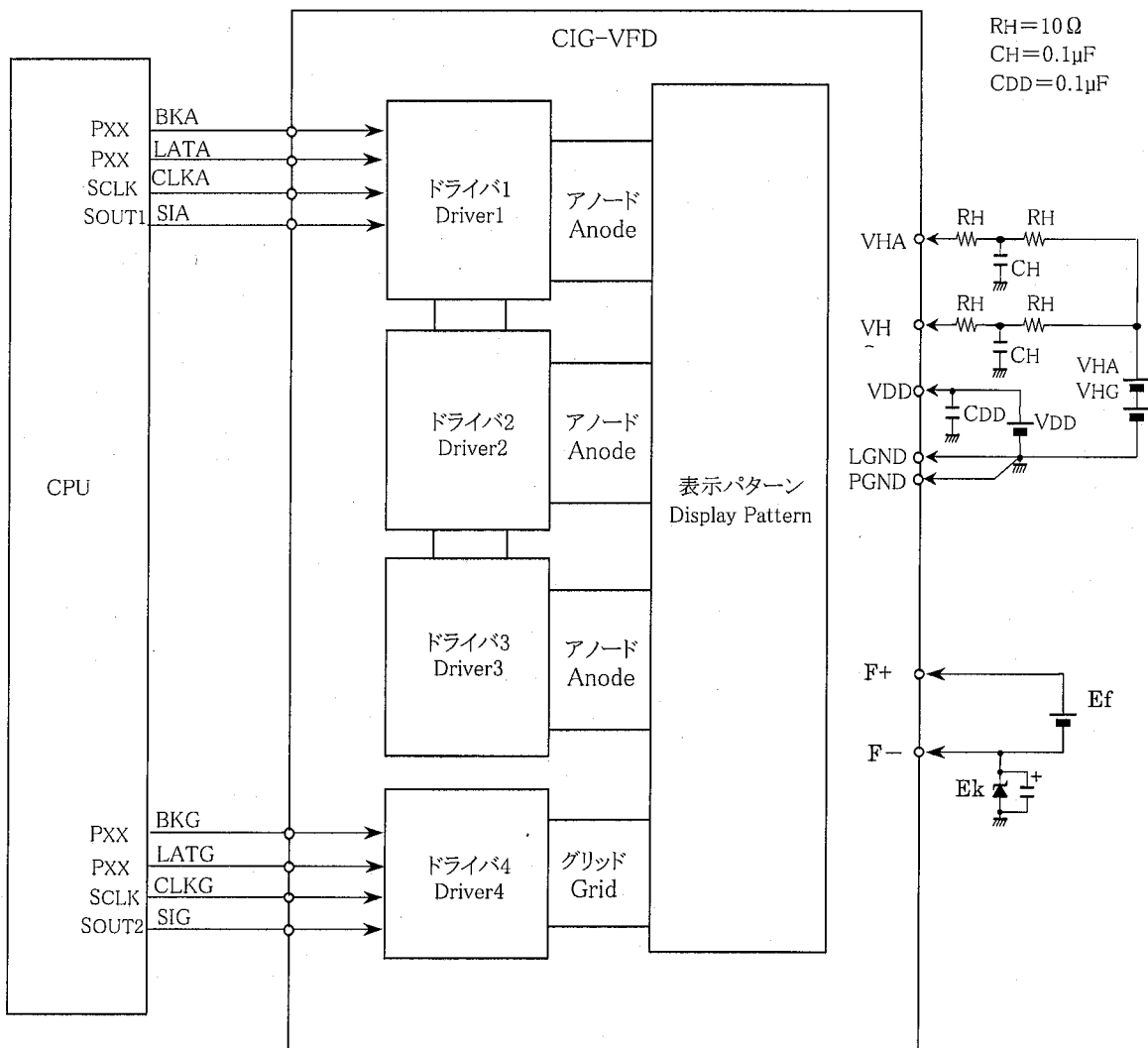
Driver4

|                 |                      |   |    |    |     |     |     |     |     |     |
|-----------------|----------------------|---|----|----|-----|-----|-----|-----|-----|-----|
| 上段<br>Upper Row | レジスタ<br>Register No. | IN<br>SIG → <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>R1</td><td>R2</td><td>R3</td><td>R4</td><td>...</td><td>R62</td><td>R63</td><td>R64</td> </tr> </table> OUT<br>NC部は“H”または“L”のいずれでもかまいません。<br>NC, don't care either "H" or "L". | R1 | R2 | R3  | R4  | ... | R62 | R63 | R64 |
| R1              | R2                   |   | R3 | R4 | ... | R62 | R63 | R64 |     |     |
| 下段<br>Lower Row | 割り付け<br>Assignment   |   |    |    |     |     |     |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| R1  | R2  | R3  | R4  | R5  | R6  | R7  | R8  | R9  | R10 | R11 | R12 | R13 | R14 | R15 | R16 |
| 1G  | 2G  | 3G  | 4G  | 5G  | 6G  | 7G  | 8G  | 9G  | 10G | 11G | 12G | 13G | 14G | 15G | 16G |
| R17 | R18 | R19 | R20 | R21 | R22 | R23 | R24 | R25 | R26 | R27 | R28 | R29 | R30 | R31 | R32 |
| 17G | 18G | 19G | 20G | 21G | 22G | 23G | 24G | 25G | 26G | 27G | 28G | 29G | 30G | 31G | 32G |
| R33 | R34 | R35 | R36 | R37 | R38 | R39 | R40 | R41 | R42 | R43 | R44 | R45 | R46 | R47 | R48 |
| 33G | 34G | 35G | 36G | 37G | 38G | 39G | 40G | 41G | 42G | 43G | NC  | NC  | NC  | NC  | NC  |
| R49 | R50 | R51 | R52 | R53 | R54 | R55 | R56 | R57 | R58 | R59 | R60 | R61 | R62 | R63 | R64 |
| NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  | NC  |

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CIG-VFDのブロック図と駆動回路例 : CIG-VFD Block Diagram and Drive Circuit Example



注1) 直流抵抗RHは電流制限用の抵抗です。CH, CDDはノイズフィルター用のパスコンです。

Note1) The series resistor RH is resistor for limitation of over current. CH and CDD is the capacitors for noise filter to the VH and VDD.

注2) 本製品はICを含むデバイスです。ICの破壊モード(ショートモード)に対応する回路設計を推奨します。

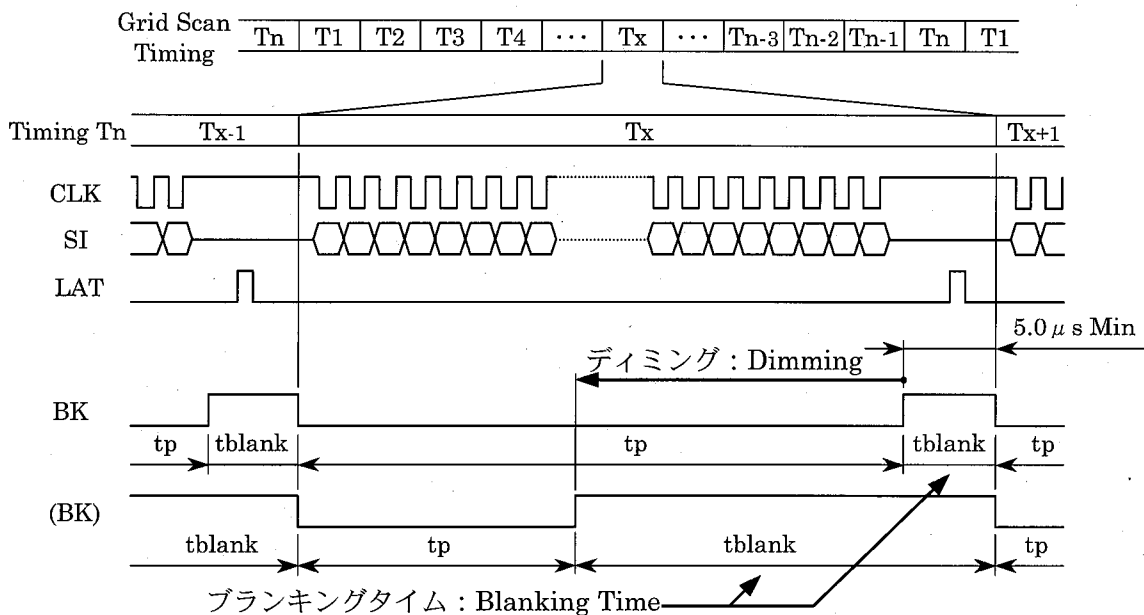
Note2) This product is the device with built-in IC. The design of the PWB should be considered for the destructive mode (short mode) of IC.

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グリッドスキャンデータ : Grid Scan Data Protocol

| スキャンタイミング<br>Grid Scan Timing | 選択グリッド<br>Grid Select | 選択アノード<br>Anode Select | グリッドのオン/オフタイミング ON/OFF timing of Grid |    |    |    |    |    |       |     |     |     |     |     |
|-------------------------------|-----------------------|------------------------|---------------------------------------|----|----|----|----|----|-------|-----|-----|-----|-----|-----|
|                               |                       |                        | 1G                                    | 2G | 3G | 4G | 5G | 6G | ..... | 39G | 40G | 41G | 42G | 43G |
| T1                            | 1G                    | A                      | H                                     | L  | L  | L  | L  | L  | ..... | L   | L   | L   | L   | L   |
| T2                            | 1G & 2G               | B,C,D                  | H                                     | H  | L  | L  | L  | L  | ..... | L   | L   | L   | L   | L   |
| T3                            | 2G & 3G               | A,E,F                  | L                                     | H  | H  | L  | L  | L  | ..... | L   | L   | L   | L   | L   |
| T4                            | 3G & 4G               | B,C,D                  | L                                     | L  | H  | H  | L  | L  | ..... | L   | L   | L   | L   | L   |
| T5                            | 4G & 5G               | A,E,F                  | L                                     | L  | L  | H  | H  | L  | ..... | L   | L   | L   | L   | L   |
| T6                            | 5G & 6G               | B,C,D                  | L                                     | L  | L  | L  | H  | H  | ..... | L   | L   | L   | L   | L   |
| .                             | .                     | .                      | .                                     | .  | .  | .  | .  | .  | .     | .   | .   | .   | .   | .   |
| .                             | .                     | .                      | .                                     | .  | .  | .  | .  | .  | .     | .   | .   | .   | .   | .   |
| .                             | .                     | .                      | .                                     | .  | .  | .  | .  | .  | .     | .   | .   | .   | .   | .   |
| T39                           | 38G & 39G             | A,E,F                  | L                                     | L  | L  | L  | L  | L  | ..... | H   | L   | L   | L   | L   |
| T40                           | 39G & 40G             | B,C,D                  | L                                     | L  | L  | L  | L  | L  | ..... | H   | H   | L   | L   | L   |
| T41                           | 40G & 41G             | A,E,F                  | L                                     | L  | L  | L  | L  | L  | ..... | L   | H   | H   | L   | L   |
| T42                           | 41G & 42G             | B,C,D                  | L                                     | L  | L  | L  | L  | L  | ..... | L   | L   | H   | H   | L   |
| T43                           | 42G & 43G             | A,E,F                  | L                                     | L  | L  | L  | L  | L  | ..... | L   | L   | L   | H   | H   |
| T44                           | 43G                   | B                      | L                                     | L  | L  | L  | L  | L  | ..... | L   | L   | L   | L   | H   |

タイミングチャート: Timing Chart



下記は駆動デューティです。  
The following is Duty Factor  
at the operating.

$$Du = \frac{tp}{(tp + tblank) \times n}$$

'n'はタイミング数です。本仕様ではn=44です。

'n' shows the number of timings. n=44 in this specification.

注1) データ書き込み時以外はCLKをHighにしておいて下さい。

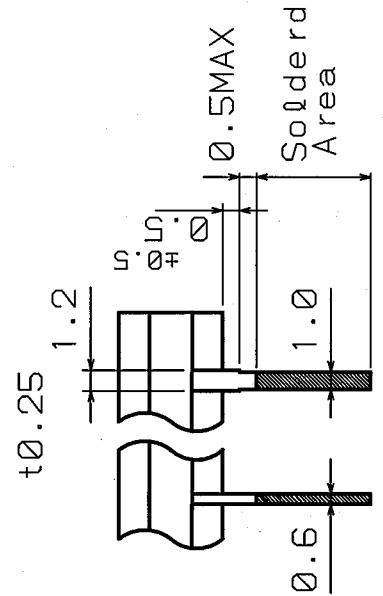
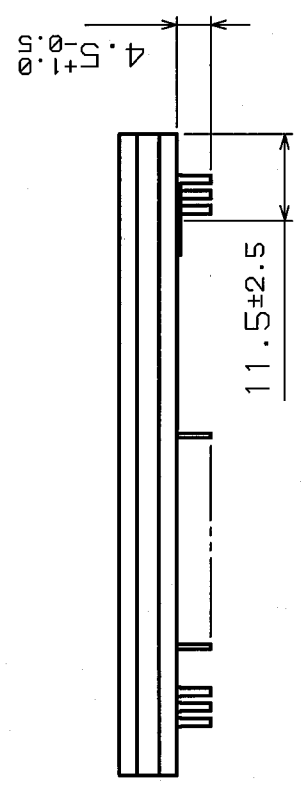
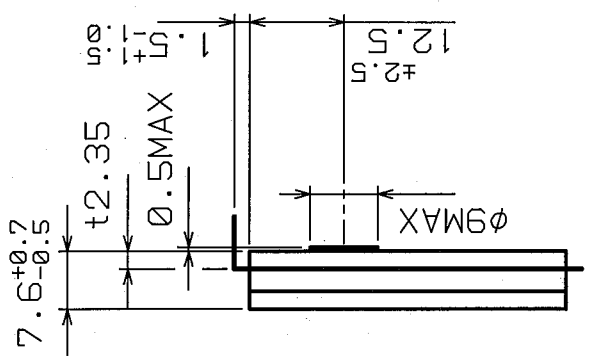
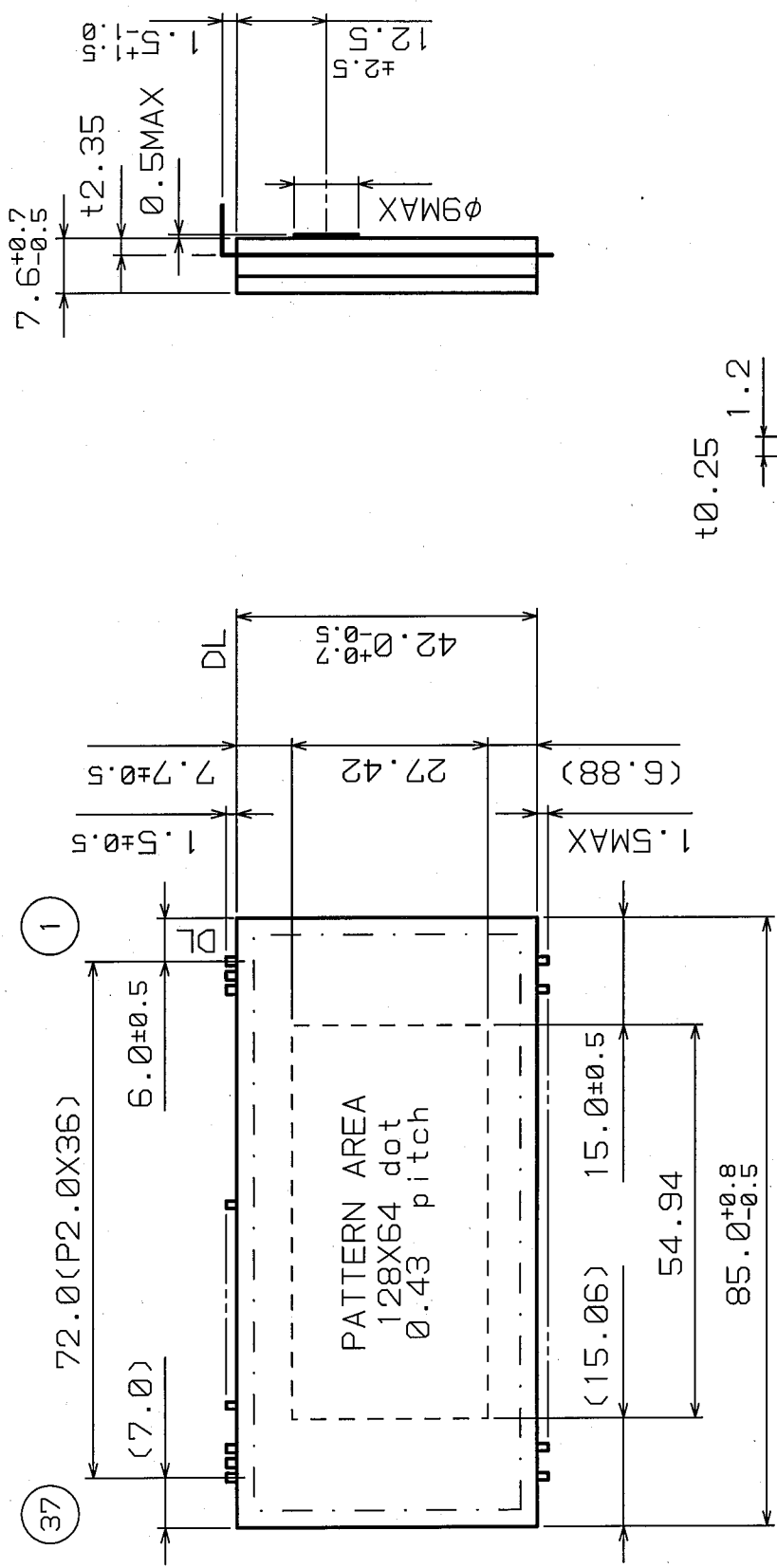
Note1) When you Don't write the data, CLK should be set to high.

注2) グリッドスキャンを停止しないで下さい。

停止した場合はVFDが恒久破壊する危険があります。

Note2) Grid Scan must not be stopped. It may cause permanent damage to VFD.

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OTHER F-LEAD  
LEAD DETAILS

(unit in mm)

# LEAD FREE SOLDER

GP1204AI  
OUTER DIMENSION



PIN CONNECTION

| PIN NO.    | 3  | 3  | 3  | 3   | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 |    |
|------------|----|----|----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| CONNECTION |    |    |    | LPG | VV | BV | HH | DD | AA | AA | AA | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS |
|            | FF | FF | FF | FF  | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF | FF |    |
|            | +  | +  | +  | +   | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  | +  |    |
|            |    |    |    |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|            |    |    |    |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|            |    |    |    |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|            |    |    |    |     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

NOTE

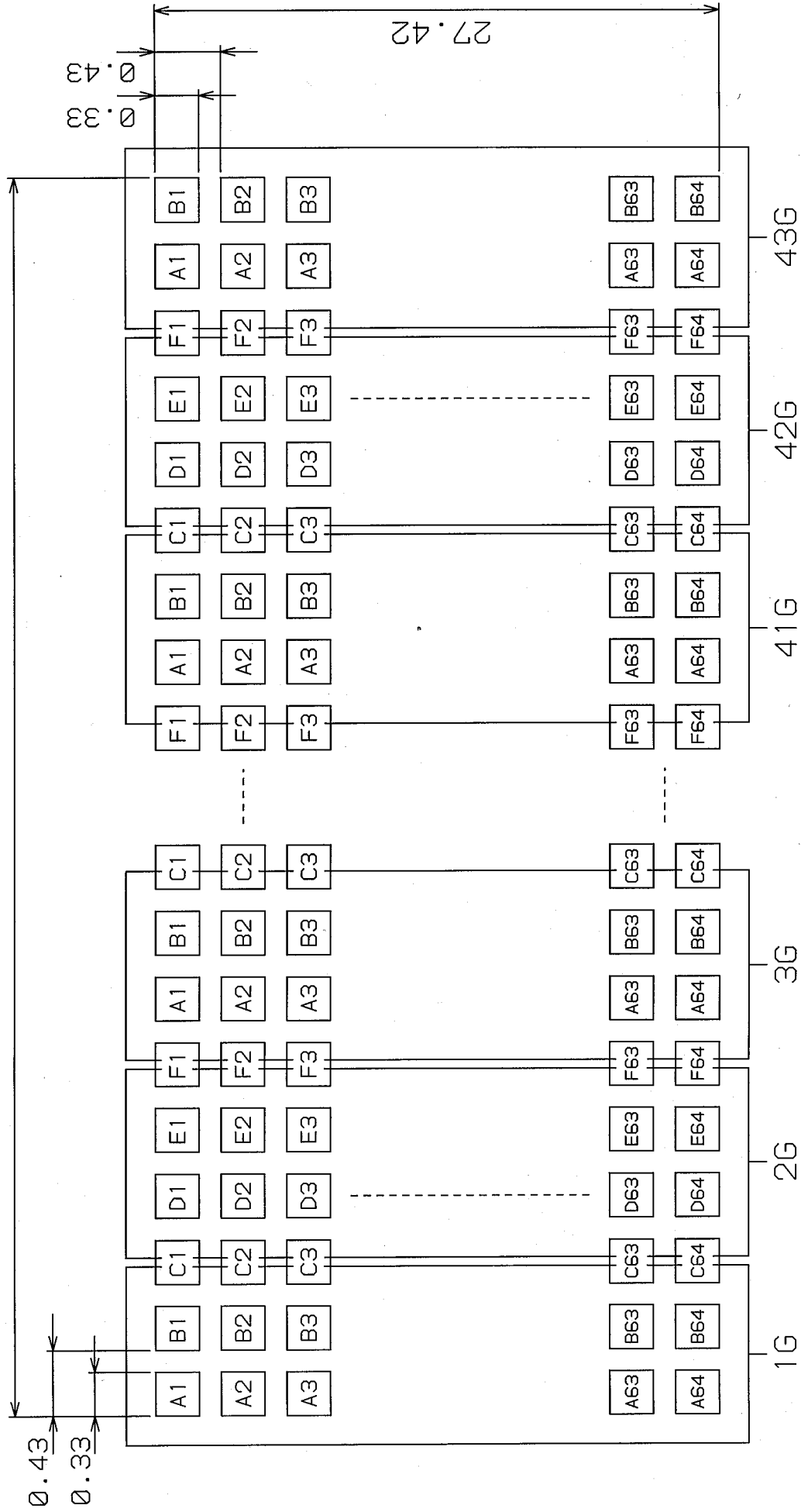
- 1) F-, F+ --- Filament
- 2) NP --- No pin
- 3) DL --- Datum Line
- 4) LGND --- Logic GND pin
- 5) PGND --- Power GND pin
- 6) VHA, G --- High Voltage Supply pin
- 7) VDD --- Logic Voltage Supply pin
- 8) BKA, BKG --- Driver Output Blanking
- 9) LATA, LATG --- Latch Register Input
- 10) CLKA, CLKG --- Shift Register Clock
- 11) SIA, SIG --- Serial Data Input
- 12) SOA, SOG --- Serial Data Output (to be open, if don't use)
- 13) Solder composition is Sn-3Ag-0.5Cu.

(unit in mm)

GP1204AI  
OUTER DIMENSION

PATTERN DETAIL

54.94



COLOR OF ILLUMINATION

Green (G. x=0.24, y=0.41) - - - - All up pattern.

(unit in mm)

GP1204AI  
PATTERN DETAIL  
COLOR OF ILLUMINATION

# Vacuum Fluorescent Display Quality Inspection Standard

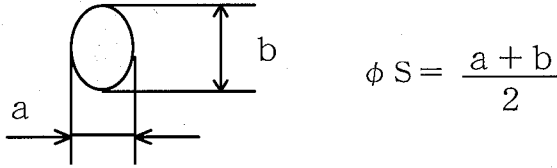
## 蛍光表示管品質判定基準

### General 一般

This standard should be adapted to the VFD quality inspection.

本仕様書は蛍光表示管の品質検査規格に適用される。

### Inspection Condition 検査条件

| Item                                  | Condition   |
|---------------------------------------|---|
| ①VFD Operating Condition.<br>VFD 駆動条件 | Typ. Recommended Condition<br>推奨TYP. 駆動条件   |
| ②Inspection Aide<br>検査付帯条件            | The inspection is to be performed with Futaba standard filter* <sup>1</sup> or a applicable customer's filter and unaided eyes from 30cm distance under brightness of 90-110 lx.<br>Futaba標準フィルター* <sup>1</sup> または顧客指定フィルターを通して30cmの距離から、90-110 lx の周囲照度にて、目視判定する。 |
| ③Defect Point Definition<br>不良点の測定方法  |    |

Limit sample should be provided upon mutual agreement by both parties when necessary.  
限度見本は必要に応じ、両者協議の上設定するものとする。

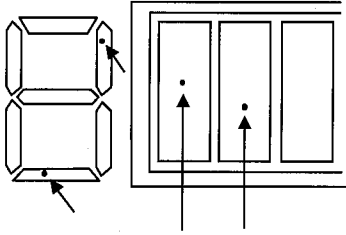
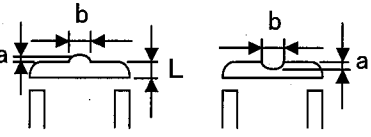
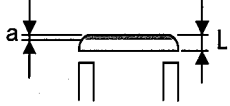
Note \*1

Futaba standard filter  
双葉標準フィルター

| Standard filter<br>標準フィルター | Type No.<br>型名 | Manufacturer<br>メーカー        | Application<br>用途 |                       |                 |             |     |
|----------------------------|----------------|-----------------------------|-------------------|-----------------------|-----------------|-------------|-----|
|                            |                |                             | Automotive<br>車載  | Home Appliance<br>民生  |                 |             |     |
|                            |                |                             |                   | Office machine<br>事務機 | Consumer<br>家電用 | Audio<br>音響 | VTR |
| Gray smoke<br>グレイスモーク      | #530           | MITSUBISHI RAYON<br>三菱レーヨン製 | ○                 | ○                     | ○               |             |     |
| Wine red<br>ワインレッド         | PZ-1123-R      | DIATEC<br>(株)ダイヤテック製        |                   |                       |                 | ○           | ○   |

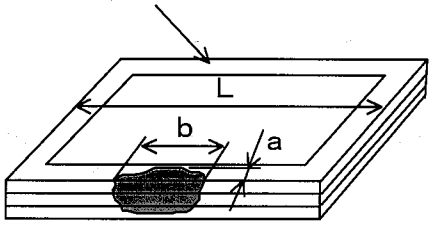
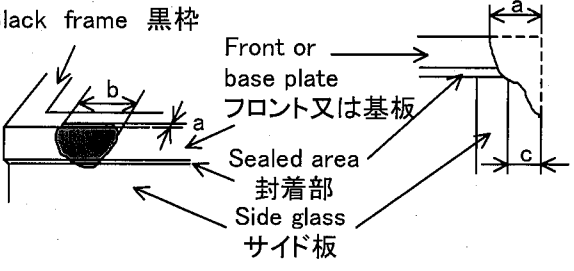
形名 Type No.  
GP1204AI

## Individual Quality Standard 個別品質基準

| Item<br>項目   | Phenomena<br>現象   | Criterion<br>判定基準  |
|--|---|--|
| ① Foreign<br>Particles・<br>Black Spot・<br>Printing Error<br>異物・黒点・<br>印刷不良   | Spots(Black spot)on the lighted segment<br>due to dirt or dust.<br>セグメントの斑点状の発光ムラ(黒点)。<br> | 1.A black spot of over $\Phi 0.3\text{mm}$ is counted<br>as defected point.<br>s= $\Phi 0.3\text{mm}$ を超える物は不良とする。<br>2.In case of spot size is over $\Phi 0.2\text{mm}$ ,less than<br>0.3mm,one spot on the same segment,<br>or maximum 3 spots in a display is to be allowed.<br>$\Phi 0.2\text{mm}$ 以上 $\Phi 0.3\text{mm}$ 以下は、セグメントに1箇所まで、<br>全セグメントに3箇所までを良品とする。<br>3.A spot of less than $\Phi 0.2\text{mm}$ should not be<br>counted as defect point.<br>$\Phi 0.2\text{mm}$ 未満の物は個数に拘わらず良品とする。 |
| ② Irregularity of<br>segment shape<br>by printing error.<br>セグメント凹凸・<br>印刷不良 | Partial irregularity on a segment.<br>セグメント形状の部分的凹凸<br>                                    | 1.Acceptable size of irregularities with respect to<br>the segment width(L).<br>セグメント幅(L)に対する凹凸の許容寸法。<br>a=0.3mm max., b=0.3mm max.,acceptable.<br>a=0.3mm 以下、b=0.3mm を良品とする。<br>2.In case of the (L) below 0.5mm wide,the acceptable<br>irregularities is a=1/2max. of the segment width(L).<br>尚、セグメント幅(L)が0.5mm以下の場合は、<br>a $\leq 1/2L$ を良品とする。   |
| ③ Uneven<br>luminance<br>輝度ムラ  | Partial dark area on the lighted<br>segment.<br>発光面の部分的な輝度差   | No significant irregularity of luminance is acceptable.<br>著しい物は無き事。   |
| ④ Shaded Segment<br>字カケ  | Shaded area appeared on the edge of<br>segments<br>セグメント端部の半影<br>                        | 1.Shaded Segments up to 1/3 of the segment width<br>are accepted.<br>セグメント幅(L)の1/3までを良品とする。<br>2.In case of a segment below 0.5mm wide, the<br>acceptable shaded segment should be up to 1/2 of<br>the segment width.<br>但し、L $\leq 0.5\text{mm}$ の場合は、1/2迄を良品とする。   |
| ⑤ Extra lighting<br>モレ発光   | Undesirable lighting area or points,<br>a star dust or a bright spot due<br>like to extra phosphor particle.<br>発光パターン以外への蛍光体付着<br>による星屑状、輝点状の不要発光                          | Extra lighting which can be clearly observed through<br>the specified filter should be judged as a defect.<br>指定フィルターを通して不要発光のはっきり判る物を<br>不良とする。   |
| ⑥ Scratch/Stain<br>on/in glass<br>ガラス傷・汚れ                                    | A scratch,dent,or foreign particles<br>such as stain,attached on the<br>surface or the inside of the front<br>glass.<br>フロントガラス内面・表面のガラス面の傷、<br>シミ等の異物付着                    | 1.Scratch which can be clearly observed through the<br>specified filter should be judged as defect.<br>指定フィルターを通して傷のはっきり判る物を不良<br>とする。<br>2.The criterion for the dent and foreign particle are<br>the same as the specified in ①.<br>打痕状の傷、異物等は、①頁と同等判定とする。   |
| ⑦ Chip on the<br>front glass and<br>base plate<br>ガラス欠け                      | For chip on the front glass and base<br>plate,refer to the next page.<br>ガラス欠けについては、次頁参照  | Refer to the next page.<br>次頁参照  |

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## Criterion for the glass chip on the front glass or the base plate.

| Definition<br>定義  | Judgment Criterion<br>判定基準   |         |        |         |   |   |              |                                |         |        |         |           |                                |         |        |         |
|---|--|---------|--------|---------|---|---|--------------|--------------------------------|---------|--------|---------|-----------|--------------------------------|---------|--------|---------|
| <div style="text-align: center;"> <p>Black frame 黒枠</p>  </div> <div style="margin-top: 20px;"> <p>Black frame 黒枠</p>  </div> <p>a : depth of chipping<br/>欠けの奥行き寸法</p> <p>b : length of chipping<br/>欠けの長さ寸法</p> <p>c : chipping size in relation to thickness of the side glass.<br/>サイド板厚に対する欠け寸法</p> <p>L : package width (length wide)<br/>パッケージ幅 (長辺方向)</p> | <p>1) Chipping size Spec. 欠けの寸法規格(mm)</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th></th> <th>VFD:a</th> <th>FLVFD:a</th> <th>b</th> <th>c</th> </tr> </thead> <tbody> <tr> <td><math>L \leq 100</math></td> <td>within the black frame<br/>黒枠以内</td> <td>3.0max.</td> <td>10max.</td> <td>1/3max.</td> </tr> <tr> <td><math>L &gt; 100</math></td> <td>within the black frame<br/>黒枠以内</td> <td>3.5max.</td> <td>15max.</td> <td>1/3max.</td> </tr> </tbody> </table> <p>VFD : vacuum fluorescent display<br/>蛍光表示管</p> <p>FLVFD : Front Luminous Vacuum Fluorescent Display<br/>前面発光型蛍光表示管</p> <p>2) A chip with "a" less than 1mm should not be counted as defect point.<br/>a寸法が1mm未満の場合は欠点としない。</p> <p>3) A chip area covered with sealing cement should not be counted as defect point.<br/>封着前の欠けは、欠けの中に封着セメントが流入していれば欠点としない。</p> <p>4) Up to 3 chips within this specification in a same display to be allowed.<br/>表示管全体で規格内の欠け数は3ヶまで良品とする。</p> |         | VFD:a  | FLVFD:a | b | c | $L \leq 100$ | within the black frame<br>黒枠以内 | 3.0max. | 10max. | 1/3max. | $L > 100$ | within the black frame<br>黒枠以内 | 3.5max. | 15max. | 1/3max. |
|   | VFD:a  | FLVFD:a | b      | c       |   |   |              |                                |         |        |         |           |                                |         |        |         |
| $L \leq 100$  | within the black frame<br>黒枠以内   | 3.0max. | 10max. | 1/3max. |   |   |              |                                |         |        |         |           |                                |         |        |         |
| $L > 100$   | within the black frame<br>黒枠以内   | 3.5max. | 15max. | 1/3max. |   |   |              |                                |         |        |         |           |                                |         |        |         |

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