GRAPhICS ENgINE

YGV641 VC1N
Cutting-edge GDC with Sprite Architecture

Master of "Animating"

Fully-featured animations are possible for a simple system enabled by this GDC. Experience the cutting-edge "easiness yet quality" display technology accomplished by the Yamaha’s proprietary sprite-based control mechanism and graphics data compression method.

Feel the new "norm" for yourself.

APPLICATIONS
- Washing Machines
- Microwaves
- Rice Cookers
- Refrigerators
- Health-case and Medical Equipment
- FA equipment
- Automotives

Features Summary
- Sprite-based drawing architecture enables to implement GUI with only several bytes of control data.
- 341 Sprites per screen at maximum are displayed simultaneously
- Animation of 24 bit full color at 60 fps is supported.
- Graphics data is compressed approximately to 1/3 to reduce memory size drastically.
- Adobe Flash can be used for authoring graphic contents.

APPLICATION DIAGRAM

CPU Interface 3.3V~5.0V 3.3V Digital

CPU
- V850 M16C RISC, etc...

Examples,
- Clock 20MHz
- ROM 64kB
- RAM 4kB

8bit Parallel Bus Serial Bus

8 6MHz~20MHz

General Table Line Processor VRAM Line Buffer
Color Palette & Register Sprite Processor CRT Controller
Macro Engine Sprite & Font Data Decoder Timing Controller

Flash ROM

Compressed Data
- Sprites Data
- Font Data
- 35% Lossless Data

SQFP100 (YGV641-SZ)
- 16.00 mm(W)x16.00 mm(D)x1.70 mm(H)
- WQVGA 400 x 240
- QVGA 320 x 240
Various features for rich expression

Each sprite is associated with a twelve-byte attribute data that defines its position, scaling, rotation, transparency, colors, and all the other features. A macro command execution engine is available to control these attribute data making it possible to animate them at 60 fps easily. The macro command engine is triggered by a host CPU as well as macro command stored in Flash ROM to further reduce a host MCU load.

**Alpha-Blending Between Layers**
Pixel-by-pixel blending controls

**Clipping (Masking)**
Sprites, Texts, or Lines can be used as masks

**Animation**
Macro Commands allow complicated animations easily

**Authoring Supports**
Data authored in Adobe Flash® format can be converted for use in Yamaha-supplied authoring tool.

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**SPRITES**

- **Number of Sprite**
  - Up to 341 per frame

- **Size**
  - 512 dot

- **Scroll**
  - 8dot /Step

- **Alpha-blending**

- **Color Palettes**
  - 1024 colors selectable from;
  - 64 sets of 16-color palette
  - 16 sets of 64-color palette
  - 4 sets of 256-color palette

- **Colors**
  - Supports 2-, 16-, 64-, 256-color palette out of 24-bit RGB
  - Or 16-, 18-, 24-bit RGB True color

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**TEXTS**

- **Up to 1,948 letters per frame**
- **Up to 64 characters per field**

- **Font Size**
  - From 1x1 to 64x64 in pixel

- **Font Rendering**
  - Supports proportional font and kerning

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**LINES**

- **Up to 510 lines per screen**
- Direct draw by specifying its start and end point coordinates

- **Anti-aliasing**

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**YAMAHA CORPORATION**

Semiconductor Div. 253 Matsunami-cho, Iwata, Shizuoka 438-0192 Japan
http://www.yamaha.co.jp/product/ie/

Customer Service
Head Quarter
Tokyo Office
Osaka Office

TEL: 0559-62-4918 FAX: 0559-62-5054
TEL: 03-5488-5431 FAX: 03-5488-5086
TEL: 06-6466-0326 FAX: 06-6466-0391

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