

TMS99XX

1.0

Generated by Doxygen 1.9.1

1 LICENSE	1
2 TMS99XX Video Display Processor Library	3
2.1 Release Versions	3
2.1.1 Current	3
2.1.2 Past	3
2.2 Requirements	3
2.3 Building	3
2.4 Documentation	3
3 Data Structure Documentation	5
3.1 u_tms99XX_colorTable::s_cDataNibbles Struct Reference	5
3.1.1 Detailed Description	5
3.1.2 Field Documentation	5
3.1.2.1 color1	5
3.1.2.2 color2	5
3.2 u_tms99XX_spriteAttributeTable::s_dataNibbles Struct Reference	6
3.2.1 Detailed Description	6
3.2.2 Field Documentation	6
3.2.2.1 colorCode	6
3.2.2.2 earlyClockBit	6
3.2.2.3 horizontalPos	6
3.2.2.4 na	6
3.2.2.5 name	7
3.2.2.6 verticalPos	7
3.3 u_tms99XX_BMPpixelBlock::s_pDataNibbles Struct Reference	7
3.3.1 Detailed Description	7
3.3.2 Field Documentation	7
3.3.2.1 colorA	8
3.3.2.2 colorB	8
3.3.2.3 colorC	8
3.3.2.4 colorD	8
3.4 s_tms99XX Struct Reference	8
3.4.1 Detailed Description	9
3.4.2 Field Documentation	9
3.4.2.1 colorReg	9
3.4.2.2 colorTableAddr	9
3.4.2.3 nameTableAddr	9
3.4.2.4 patternTableAddr	9
3.4.2.5 register0	9
3.4.2.6 register1	9
3.4.2.7 spriteAttributeAddr	10
3.4.2.8 spritePatternAddr	10

3.4.2.9 vdpMode	10
3.5 s_tms99XX_nameTable Struct Reference	10
3.5.1 Detailed Description	10
3.5.2 Field Documentation	10
3.5.2.1 data	11
3.6 s_tms99XX_spritePatternTable16x16 Struct Reference	11
3.6.1 Detailed Description	11
3.6.2 Field Documentation	11
3.6.2.1 data	11
3.7 s_tms99XX_spritePatternTable8x8 Struct Reference	11
3.7.1 Detailed Description	12
3.7.2 Field Documentation	12
3.7.2.1 data	12
3.8 u_tms99XX_BMPpixelBlock Union Reference	12
3.8.1 Detailed Description	13
3.8.2 Field Documentation	13
3.8.2.1 data	13
3.8.2.2 dataNibbles	13
3.9 u_tms99XX_colorTable Union Reference	13
3.9.1 Detailed Description	14
3.9.2 Field Documentation	14
3.9.2.1 data	14
3.9.2.2 dataNibbles	14
3.10 u_tms99XX_patternTable8x8 Union Reference	14
3.10.1 Detailed Description	14
3.10.2 Field Documentation	15
3.10.2.1 data	15
3.11 u_tms99XX_spriteAttributeTable Union Reference	15
3.11.1 Detailed Description	16
3.11.2 Field Documentation	16
3.11.2.1 data	16
3.11.2.2 dataNibbles	16
4 File Documentation	17
4.1 LICENSE.md File Reference	17
4.2 README.md File Reference	17
4.3 tms99XX.h File Reference	17
4.3.1 Function Documentation	18
4.3.1.1 checkTMS99XXvram()	18
4.3.1.2 clearTMS99XXvramData()	19
4.3.1.3 getTMS99XXstatus()	19
4.3.1.4 getTMS99XXvramData()	19

4.3.1.5	initTMS99XX()	20
4.3.1.6	setTMS99XXbackgroundColor()	20
4.3.1.7	setTMS99XXblank()	21
4.3.1.8	setTMS99XXirq()	21
4.3.1.9	setTMS99XXmode()	21
4.3.1.10	setTMS99XXreg()	21
4.3.1.11	setTMS99XXspriteMagnify()	22
4.3.1.12	setTMS99XXspriteSize()	22
4.3.1.13	setTMS99XXtxtColor()	22
4.3.1.14	setTMS99XXvramConstData()	23
4.3.1.15	setTMS99XXvramData()	23
4.3.1.16	setTMS99XXvramReadAddr()	24
4.3.1.17	setTMS99XXvramSpriteTerm()	24
4.3.1.18	setTMS99XXvramTableData()	24
4.3.1.19	setTMS99XXvramWriteAddr()	25
4.4	tms99XXascii.h File Reference	25
4.4.1	Variable Documentation	25
4.4.1.1	c_tms99XX_ascii	26
4.5	tms99XXdatatypes.h File Reference	26
4.6	tms99XXdefines.h File Reference	27
4.6.1	Macro Definition Documentation	28
4.6.1.1	BLK_SCRN_BIT	28
4.6.1.2	BMP_MODE	28
4.6.1.3	COLOR_TABLE_ADDR	28
4.6.1.4	COLOR_TABLE_ADDR_SCALE	28
4.6.1.5	GFXI_MODE	29
4.6.1.6	GFXII_MODE	29
4.6.1.7	IRQ_BIT	29
4.6.1.8	MEM_SIZE	29
4.6.1.9	NAME_TABLE_ADDR	29
4.6.1.10	NAME_TABLE_ADDR_SCALE	29
4.6.1.11	PATTERN_TABLE_ADDR	29
4.6.1.12	PATTERN_TABLE_ADDR_SCALE	30
4.6.1.13	REGISTER_0	30
4.6.1.14	REGISTER_1	30
4.6.1.15	REGISTER_2	30
4.6.1.16	REGISTER_3	30
4.6.1.17	REGISTER_4	30
4.6.1.18	REGISTER_5	30
4.6.1.19	REGISTER_6	31
4.6.1.20	REGISTER_7	31
4.6.1.21	SPRITE_ATTRIBUTE_TABLE_ADDR	31

4.6.1.22 SPRITE_ATTRIBUTE_TABLE_ADDR_SCALE	31
4.6.1.23 SPRITE_MAG_BIT	31
4.6.1.24 SPRITE_PATTERN_TABLE_ADDR	31
4.6.1.25 SPRITE_PATTERN_TABLE_ADDR_SCALE	31
4.6.1.26 SPRITE_SIZE_BIT	31
4.6.1.27 SPRITE_TERM	32
4.6.1.28 TMS_BLACK	32
4.6.1.29 TMS_CYAN	32
4.6.1.30 TMS_DARK_BLUE	32
4.6.1.31 TMS_DARK_GREEN	32
4.6.1.32 TMS_DARK_RED	32
4.6.1.33 TMS_DARK_YELLOW	32
4.6.1.34 TMS_GREY	32
4.6.1.35 TMS_LIGHT_BLUE	33
4.6.1.36 TMS_LIGHT_GREEN	33
4.6.1.37 TMS_LIGHT_RED	33
4.6.1.38 TMS_LIGHT_YELLOW	33
4.6.1.39 TMS_MAGENTA	33
4.6.1.40 TMS_MEDIUM_GREEN	33
4.6.1.41 TMS_MEDIUM_RED	33
4.6.1.42 TMS_TRANSPARENT	34
4.6.1.43 TMS_WHITE	34
4.6.1.44 TXT_MODE	34
4.6.1.45 VMEM_AMT_BIT	34

Chapter 1

LICENSE

license: MIT

Copyright 2022 Johnathan Convertino

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Chapter 2

TMS99XX Video Display Processor Library

Software Library for TI TMS9918,28,29 video display processors.

author: Jay Convertino

data: 2024.11.02

license: MIT

2.1 Release Versions

2.1.1 Current

- pre-alpha

2.1.2 Past

- none

2.2 Requirements

- sdcc v4.0.0 or greater

2.3 Building

Must be built with the arch libraries for correct linkage.

2.4 Documentation

- See doxygen generated document

Chapter 3

Data Structure Documentation

3.1 `u_tms99XX_colorTable::s_cDataNibbles` Struct Reference

```
#include <tms99XXdatatypes.h>
```

Data Fields

- `uint8_t color2:4`
- `uint8_t color1:4`

3.1.1 Detailed Description

contains color fields

3.1.2 Field Documentation

3.1.2.1 `color1`

```
u_tms99XX_colorTable::s_cDataNibbles::color1
```

top nibble, color for 1

3.1.2.2 `color2`

```
u_tms99XX_colorTable::s_cDataNibbles::color2
```

bottom nibble, color for 0

The documentation for this struct was generated from the following file:

- [tms99XXdatatypes.h](#)

3.2 u_tms99XX_spriteAttributeTable::s_dataNibbles Struct Reference

```
#include <tms99XXdatatypes.h>
```

Data Fields

- uint8_t [verticalPos](#)
- uint8_t [horizontalPos](#)
- uint8_t [name](#)
- uint8_t [colorCode](#):4
- uint8_t [na](#):3
- uint8_t [earlyClockBit](#):1

3.2.1 Detailed Description

contains sprite attribute fields

3.2.2 Field Documentation

3.2.2.1 colorCode

```
u_tms99XX_spriteAttributeTable::s_dataNibbles::colorCode
```

color to set sprite pixels. this is the lower 4 bits (3 to 0)

3.2.2.2 earlyClockBit

```
u_tms99XX_spriteAttributeTable::s_dataNibbles::earlyClockBit
```

feature for slow movement of sprites off screen. bit 7

3.2.2.3 horizontalPos

```
u_tms99XX_spriteAttributeTable::s_dataNibbles::horizontalPos
```

horizontal position of sprite on screen.

3.2.2.4 na

```
u_tms99XX_spriteAttributeTable::s_dataNibbles::na
```

nothing, always set to 0. bits 6 to 4.

3.2.2.5 name

```
u_tms99XX_spriteAttributeTable::s_dataNibbles::name
```

name of sprite on screen (pointer to pattern table object).

3.2.2.6 verticalPos

```
u_tms99XX_spriteAttributeTable::s_dataNibbles::verticalPos
```

vertical position of sprite on screen.

The documentation for this struct was generated from the following file:

- [tms99XXdatatypes.h](#)

3.3 u_tms99XX_BMPpixelBlock::s_pDataNibbles Struct Reference

```
#include <tms99XXdatatypes.h>
```

Data Fields

- uint8_t [colorB](#):4
- uint8_t [colorA](#):4
- uint8_t [colorD](#):4
- uint8_t [colorC](#):4

3.3.1 Detailed Description

contains color fields for bitmap mode. see page 8-13 of TI-VDP-Programmers_guide.pdf |-----|-----|

color A	color B
color C	color D
-----	-----

The above is a mapping of the pixel pattern on screen. The resolution is 64x48 pixels. Each row has rules for indexing from the name table into the pattern table. Rows 0,4,8,12,16,20 index into the first pixel block at offsets of 8 bytes. A name table value of 0, will be pattern pixel block 0. A name table value of 1 will actually map to byte offset of 8, the next chunk of pixels. Pixels are chunked in 8 byte sections. Since the rows name lookup will loop after 4 rows. Meaning Row 1,5,9,13,17,21 name table will resolve to the same value in the pattern table. Same for Row 0,4,8,12,16,20. To be clear row 0, name table value 0 gets pattern 0. Row 4, name table value 0 gets pattern 0 as well.

3.3.2 Field Documentation

3.3.2.1 colorA

`u_tms99XX_BMPpixelBlock::s_pDataNibbles::colorA`

color lower nibble

3.3.2.2 colorB

`u_tms99XX_BMPpixelBlock::s_pDataNibbles::colorB`

color upper nibble

3.3.2.3 colorC

`u_tms99XX_BMPpixelBlock::s_pDataNibbles::colorC`

color lower nibble

3.3.2.4 colorD

`u_tms99XX_BMPpixelBlock::s_pDataNibbles::colorD`

color upper nibble

The documentation for this struct was generated from the following file:

- [tms99XXdatatypes.h](#)

3.4 s_tms99XX Struct Reference

Struct for containing TMS99XX instances.

```
#include <tms99XXdatatypes.h>
```

Data Fields

- `uint16_t` [spritePatternAddr](#)
- `uint16_t` [spriteAttributeAddr](#)
- `uint16_t` [patternTableAddr](#)
- `uint16_t` [nameTableAddr](#)
- `uint16_t` [colorTableAddr](#)
- `uint8_t` [vdpMode](#)
- `uint8_t` [register0](#)
- `uint8_t` [register1](#)
- `uint8_t` [colorReg](#)

3.4.1 Detailed Description

Struct for containing TMS99XX instances.

DATA STRUCTURES

3.4.2 Field Documentation

3.4.2.1 colorReg

```
s_tms99XX::colorReg
```

color sent to register 7, background/text color.

3.4.2.2 colorTableAddr

```
s_tms99XX::colorTableAddr
```

color table address in VRAM

3.4.2.3 nameTableAddr

```
s_tms99XX::nameTableAddr
```

name table address in VRAM

3.4.2.4 patternTableAddr

```
s_tms99XX::patternTableAddr
```

pattern table address in VRAM

3.4.2.5 register0

```
s_tms99XX::register0
```

register 0 contents

3.4.2.6 register1

```
s_tms99XX::register1
```

register 1 contents

3.4.2.7 spriteAttributeAddr

```
s_tms99XX::spriteAttributeAddr
```

sprite attribute table address in VRAM

3.4.2.8 spritePatternAddr

```
s_tms99XX::spritePatternAddr
```

sprite pattern table address in VRAM

3.4.2.9 vdpMode

```
s_tms99XX::vdpMode
```

contains current mode of the VDP

The documentation for this struct was generated from the following file:

- [tms99XXdatatypes.h](#)

3.5 s_tms99XX_nameTable Struct Reference

Struct for containing TMS99XX instances.

```
#include <tms99XXdatatypes.h>
```

Data Fields

- `uint8_t` [data](#)

3.5.1 Detailed Description

Struct for containing TMS99XX instances.

3.5.2 Field Documentation

3.5.2.1 data

```
s_tms99XX_nameTable::data
```

byte for storing name table data.

The documentation for this struct was generated from the following file:

- [tms99XXdatatypes.h](#)

3.6 s_tms99XX_spritePatternTable16x16 Struct Reference

Struct for containing a 16x16 sprite pattern.

```
#include <tms99XXdatatypes.h>
```

Data Fields

- `uint8_t data` [32]

3.6.1 Detailed Description

Struct for containing a 16x16 sprite pattern.

3.6.2 Field Documentation

3.6.2.1 data

```
s_tms99XX_spritePatternTable16x16::data
```

contains 16x16 matrix of sprite pattern data. First 8, upper left. Second 8, lower left. Third 8, upper right. Last 8, lower right.

The documentation for this struct was generated from the following file:

- [tms99XXdatatypes.h](#)

3.7 s_tms99XX_spritePatternTable8x8 Struct Reference

Struct for containing a 8x8 sprite pattern.

```
#include <tms99XXdatatypes.h>
```

Data Fields

- `uint8_t data` [8]

3.7.1 Detailed Description

Struct for containing a 8x8 sprite pattern.

3.7.2 Field Documentation

3.7.2.1 data

`s_tms99XX_spritePatternTable8x8::data`

contains 8x8 matrix of sprite pattern data

The documentation for this struct was generated from the following file:

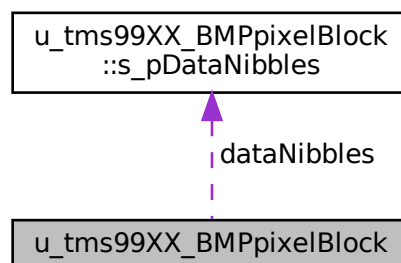
- [tms99XXdatatypes.h](#)

3.8 u_tms99XX_BMPpixelBlock Union Reference

Struct for containing a single multicolor mode pixel block.

```
#include <tms99XXdatatypes.h>
```

Collaboration diagram for `u_tms99XX_BMPpixelBlock`:



Data Structures

- struct [s_pDataNibbles](#)

Data Fields

- struct [u_tms99XX_BMPpixelBlock::s_pDataNibbles](#) dataNibbles
- `uint8_t data [2]`

3.8.1 Detailed Description

Struct for containing a single multicolor mode pixel block.

3.8.2 Field Documentation

3.8.2.1 data

`u_tms99XX_BMPpixelBlock::data`

array of 2 bytes for a 2x2 4 pixel map.

3.8.2.2 dataNibbles

struct [u_tms99XX_BMPpixelBlock::s_pDataNibbles](#) `u_tms99XX_BMPpixelBlock::dataNibbles`

The documentation for this union was generated from the following file:

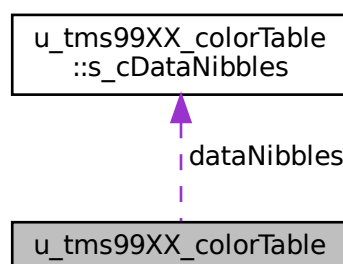
- [tms99XXdatatypes.h](#)

3.9 u_tms99XX_colorTable Union Reference

Union for containing TMS99XX color table data.

```
#include <tms99XXdatatypes.h>
```

Collaboration diagram for u_tms99XX_colorTable:



Data Structures

- struct [s_cDataNibbles](#)

Data Fields

- struct [u_tms99XX_colorTable::s_cDataNibbles](#) dataNibbles
- [uint8_t](#) data

3.9.1 Detailed Description

Union for containing TMS99XX color table data.

3.9.2 Field Documentation

3.9.2.1 data

```
u_tms99XX_colorTable::data
```

contains color data byte

3.9.2.2 dataNibbles

```
struct u\_tms99XX\_colorTable::s\_cDataNibbles u_tms99XX_colorTable::dataNibbles
```

The documentation for this union was generated from the following file:

- [tms99XXdatatypes.h](#)

3.10 u_tms99XX_patternTable8x8 Union Reference

Struct for containing a 8x8 pattern table.

```
#include <tms99XXdatatypes.h>
```

Data Fields

- [uint8_t](#) data [8]

3.10.1 Detailed Description

Struct for containing a 8x8 pattern table.

3.10.2 Field Documentation

3.10.2.1 data

u_tms99XX_patternTable8x8::data

array of 8 bytes for a 8x8 matrix.

The documentation for this union was generated from the following file:

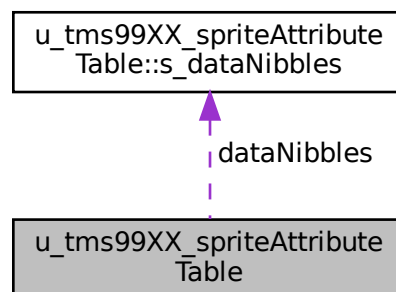
- [tms99XXdatatypes.h](#)

3.11 u_tms99XX_spriteAttributeTable Union Reference

union for containing sprite attribute data.

```
#include <tms99XXdatatypes.h>
```

Collaboration diagram for u_tms99XX_spriteAttributeTable:



Data Structures

- struct [s_dataNibbles](#)

Data Fields

- struct [u_tms99XX_spriteAttributeTable::s_dataNibbles](#) `dataNibbles`
- `uint8_t` [data](#) [4]

3.11.1 Detailed Description

union for containing sprite attribute data.

3.11.2 Field Documentation

3.11.2.1 data

```
u_tms99XX_spriteAttributeTable::data
```

array of sprite attribute data

3.11.2.2 dataNibbles

```
struct u_tms99XX_spriteAttributeTable::s_dataNibbles u_tms99XX_spriteAttributeTable::data↔  
Nibbles
```

The documentation for this union was generated from the following file:

- [tms99XXdatatypes.h](#)

Chapter 4

File Documentation

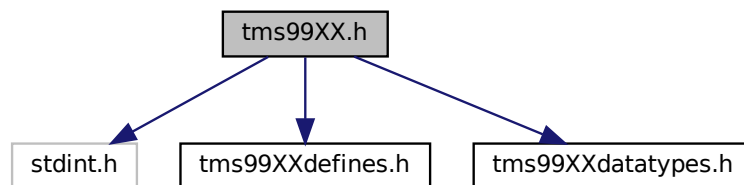
4.1 LICENSE.md File Reference

4.2 README.md File Reference

4.3 tms99XX.h File Reference

```
#include <stdint.h>
#include <tms99XXdefines.h>
#include <tms99XXdatatypes.h>
```

Include dependency graph for tms99XX.h:



Functions

- void `initTMS99XX` (struct `s_tms99XX` *const p_tms99XX, uint8_t vdpMode, uint8_t backColor)
Initialize TMS99XX struct with ports to use for input output, must match direction registers above. Register 1 has VRAM set to 16k, VDP mode set, the blank enabled(0), and all other bits in there disabled state. Memory addresses will match defines. These could be changed latter and then the `setTMS99XXmode` run for custom settings on the fly. Better option is to change the defines in this headed to your use case.
- void `setTMS99XXmode` (struct `s_tms99XX` *const p_tms99XX, uint8_t vdpMode)
Set the TMS99XX mode to one of 4. Text, Graphics I, Graphics II, and bitmap. This will also reset all addresses for the needed mode.

- void [setTMS99XXblank](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t mode)
Set the TMS99XX to blank the current sprite and pattern planes.
- void [setTMS99XXirq](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t mode)
Set the TMS99XX to irq to enabled or disabled.
- void [setTMS99XXspriteSize](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t mode)
Set the TMS99XX to sprite size to 8x8 or 16x16.
- void [setTMS99XXspriteMagnify](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t mode)
Set the TMS99XX to sprite magnify to on or off (double set size).
- void [setTMS99XXtxtColor](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t color)
Set the TMS99XX text color in text mode.
- void [setTMS99XXbackgroundColor](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t color)
Set the TMS99XX background color.
- void [setTMS99XXreg](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t regNum, uint8_t regData)
Set a register with a 8 bit value.
- int [setTMS99XXvramTableData](#) (struct [s_tms99XX](#) *const p_tms99XX, uint16_t tableAddr, void const *const p_data, int startNum, int number, int size)
Write a pattern or patterns into vram pattern table. Aligned to pattern data size.
- void [setTMS99XXvramWriteAddr](#) (struct [s_tms99XX](#) *const p_tms99XX, uint16_t vramAddr)
Set the start of the VRAM address to write to. After this is set writes will auto increment the address.
- void [setTMS99XXvramReadAddr](#) (struct [s_tms99XX](#) *const p_tms99XX, uint16_t vramAddr)
Set the start of the VRAM address to read to. After this is set read will auto increment the address.
- int [setTMS99XXvramData](#) (struct [s_tms99XX](#) *const p_tms99XX, void const *const p_data, int size)
Write array of byte data to VRAM.
- int [setTMS99XXvramConstData](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t const data, int size)
Set all data in VRAM to a constant value of some size.
- void [setTMS99XXvramSpriteTerm](#) (struct [s_tms99XX](#) *const p_tms99XX, uint8_t const num)
Set all vertical field of selected sprite number to the 0xD0. The sprite terminator.
- int [getTMS99XXvramData](#) (struct [s_tms99XX](#) *const p_tms99XX, void *p_data, int size)
Read array of byte data to VRAM.
- uint8_t [getTMS99XXstatus](#) (struct [s_tms99XX](#) *const p_tms99XX)
Read status register of VDP.
- void [clearTMS99XXvramData](#) (struct [s_tms99XX](#) *const p_tms99XX)
Clear all data from VRAM from 0x0000 to 0x3FFF. This will block till it has cleared all data.
- uint8_t [checkTMS99XXvram](#) (struct [s_tms99XX](#) *const p_tms99XX)
Test all VRAM. This will block till all data written.

4.3.1 Function Documentation

4.3.1.1 [checkTMS99XXvram\(\)](#)

```
uint8_t checkTMS99XXvram (
    struct s\_tms99XX *const p_tms99XX )
```

Test all VRAM. This will block till all data written.

Parameters

<code>p_tms99XX</code>	pointer to struct to contain data.
------------------------	------------------------------------

Returns

0 for error, 1 for pass.

4.3.1.2 clearTMS99XXvramData()

```
void clearTMS99XXvramData (
    struct s_tms99XX *const p_tms99XX )
```

Clear all data from VRAM from 0x0000 to 0x3FFF. This will block till it has cleared all data.

Parameters

<code>p_tms99XX</code>	pointer to struct to contain data.
------------------------	------------------------------------

4.3.1.3 getTMS99XXstatus()

```
uint8_t getTMS99XXstatus (
    struct s_tms99XX *const p_tms99XX )
```

Read status register of VDP.

Parameters

<code>p_tms99XX</code>	pointer to struct to contain data.
------------------------	------------------------------------

Returns

Status register data byte.

4.3.1.4 getTMS99XXvramData()

```
int getTMS99XXvramData (
    struct s_tms99XX *const p_tms99XX,
    void * p_data,
    int size )
```

Read array of byte data to VRAM.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>p_data</i>	pointer to data to store read data.
<i>size</i>	number of bytes to read from vram.

Returns

actual number of bytes read.

4.3.1.5 initTMS99XX()

```
void initTMS99XX (
    struct s_tms99XX *const p_tms99XX,
    uint8_t vdpMode,
    uint8_t backColor )
```

Initialize TMS99XX struct with ports to use for input output, must match direction registers above. Register 1 has VRAM set to 16k, VDP mode set, the blank enabled(0), and all other bits in there disabled state. Memory addresses will match defines. These could be changed latter and then the setTMS99XXmode run for custom settings on the fly. Better option is to change the defines in this headed to your use case.

the below includes define other tms stuffs see them for more info METHODS

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>vdpMode</i>	set or change the mode, 0 = Graphics I, 1 = Graphics II, 2 = bitmap, 4 = Text.
<i>backColor</i>	set background color to a 4 bit value.

4.3.1.6 setTMS99XXbackgroundColor()

```
void setTMS99XXbackgroundColor (
    struct s_tms99XX *const p_tms99XX,
    uint8_t color )
```

Set the TMS99XX background color.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>color</i>	4 bit color value.

4.3.1.7 setTMS99XXblank()

```
void setTMS99XXblank (
    struct s_tms99XX *const p_tms99XX,
    uint8_t mode )
```

Set the TMS99XX to blank the current sprite and pattern planes.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>mode</i>	1 is blank on, 0 is blank off

4.3.1.8 setTMS99XXirq()

```
void setTMS99XXirq (
    struct s_tms99XX *const p_tms99XX,
    uint8_t mode )
```

Set the TMS99XX to irq to enabled or disabled.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>mode</i>	0 is off, anything else is on.

4.3.1.9 setTMS99XXmode()

```
void setTMS99XXmode (
    struct s_tms99XX *const p_tms99XX,
    uint8_t vdpMode )
```

Set the TMS99XX mode to one of 4. Text, Graphics I, Graphics II, and bitmap. This will also reset all addresses for the needed mode.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>vdpMode</i>	set or change the mode, 0 = Graphics I, 1 = Graphics II, 2 = bitmap, 4 = Text.

4.3.1.10 setTMS99XXreg()

```
void setTMS99XXreg (
```

```

    struct s_tms99XX *const p_tms99XX,
    uint8_t regNum,
    uint8_t regData )

```

Set a register with a 8 bit value.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>regNum</i>	which register to write to. 0 to 7.
<i>regData</i>	data to write to register.

4.3.1.11 setTMS99XXspriteMagnify()

```

void setTMS99XXspriteMagnify (
    struct s_tms99XX *const p_tms99XX,
    uint8_t mode )

```

Set the TMS99XX to sprite magnify to on or off (double set size).

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>mode</i>	0 is off, anything else is double sprite size.

4.3.1.12 setTMS99XXspriteSize()

```

void setTMS99XXspriteSize (
    struct s_tms99XX *const p_tms99XX,
    uint8_t mode )

```

Set the TMS99XX to sprite size to 8x8 or 16x16.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>mode</i>	0 is 8x8, anything else is 16x16.

4.3.1.13 setTMS99XXtxtColor()

```

void setTMS99XXtxtColor (
    struct s_tms99XX *const p_tms99XX,
    uint8_t color )

```

Set the TMS99XX text color in text mode.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>color</i>	4 bit color value.

4.3.1.14 setTMS99XXvramConstData()

```
int setTMS99XXvramConstData (
    struct s_tms99XX *const p_tms99XX,
    uint8_t const data,
    int size )
```

Set all data in VRAM to a constant value of some size.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>data</i>	the constant to write.
<i>size</i>	number of bytes to set.

Returns

actual number of bytes wrote.

4.3.1.15 setTMS99XXvramData()

```
int setTMS99XXvramData (
    struct s_tms99XX *const p_tms99XX,
    void const *const p_data,
    int size )
```

Write array of byte data to VRAM.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>p_data</i>	pointer to data to write to vdp.
<i>size</i>	number of bytes to write to VRAM.

Returns

actual number of bytes wrote.

4.3.1.16 setTMS99XXvramReadAddr()

```
void setTMS99XXvramReadAddr (
    struct s_tms99XX *const p_tms99XX,
    uint16_t vramAddr )
```

Set the start of the VRAM address to read to. After this is set read will auto increment the address.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>vramAddr</i>	14 bit address into the vram.

4.3.1.17 setTMS99XXvramSpriteTerm()

```
void setTMS99XXvramSpriteTerm (
    struct s_tms99XX *const p_tms99XX,
    uint8_t const num )
```

Set all vertical field of selected sprite number to the 0xD0. The sprite terminator.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>num</i>	the sprite number 0 to 31 to terminate.

4.3.1.18 setTMS99XXvramTableData()

```
int setTMS99XXvramTableData (
    struct s_tms99XX *const p_tms99XX,
    uint16_t tableAddr,
    void const *const p_data,
    int startNum,
    int number,
    int size )
```

Write a pattern or patterns into vram pattern table. Aligned to pattern data size.

Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>tableAddr</i>	table start address, exe p_tms99XX->spriteAttributeAddr
<i>p_data</i>	void pointer data array that contains pattern data objects.
<i>startNum</i>	adds a offset to the base vram address.
<i>number</i>	quantity of patterns to write linearly.
<i>size</i>	of the data members in the table (all tables of member data, sizeof(data))

Returns

number of bytes actually wrote

4.3.1.19 setTMS99XXvramWriteAddr()

```
void setTMS99XXvramWriteAddr (
    struct s_tms99XX *const p_tms99XX,
    uint16_t vramAddr )
```

Set the start of the VRAM address to write to. After this is set writes will auto increment the address.

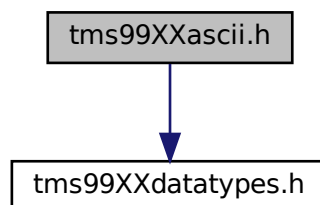
Parameters

<i>p_tms99XX</i>	pointer to struct to contain data.
<i>vramAddr</i>	14 bit address into the vram.

4.4 tms99XXascii.h File Reference

```
#include <tms99XXdatatypes.h>
```

Include dependency graph for tms99XXascii.h:

**Variables**

- const union [u_tms99XX_patternTable8x8](#) [c_tms99XX_ascii](#) []

4.4.1 Variable Documentation

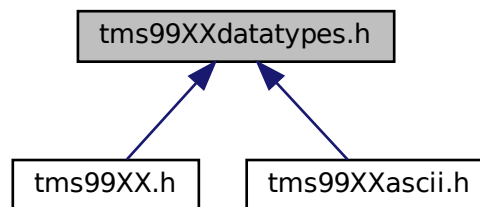
4.4.1.1 c_tms99XX_ascii

```
const union u_tms99XX_patternTable8x8 c_tms99XX_ascii[ ]
```

From TMS9918 datasheet Fixed a few bugs, duplicate > and bad lower case letters Added nulls for first 32 to pad out struct, easier to just create strings and go.

4.5 tms99XXdatatypes.h File Reference

This graph shows which files directly or indirectly include this file:

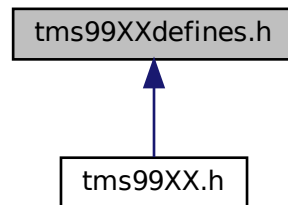


Data Structures

- struct [s_tms99XX](#)
Struct for containing TMS99XX instances.
- union [u_tms99XX_patternTable8x8](#)
Struct for containing a 8x8 pattern table.
- union [u_tms99XX_BMPpixelBlock](#)
Struct for containing a single multicolor mode pixel block.
- struct [u_tms99XX_BMPpixelBlock::s_pDataNibbles](#)
- struct [s_tms99XX_nameTable](#)
Struct for containing TMS99XX instances.
- union [u_tms99XX_colorTable](#)
Union for containing TMS99XX color table data.
- struct [u_tms99XX_colorTable::s_cDataNibbles](#)
- struct [s_tms99XX_spritePatternTable8x8](#)
Struct for containing a 8x8 sprite pattern.
- struct [s_tms99XX_spritePatternTable16x16](#)
Struct for containing a 16x16 sprite pattern.
- union [u_tms99XX_spriteAttributeTable](#)
union for containing sprite attribute data.
- struct [u_tms99XX_spriteAttributeTable::s_dataNibbles](#)

4.6 tms99XXdefines.h File Reference

This graph shows which files directly or indirectly include this file:



Macros

- #define [GFXI_MODE](#) 0
- #define [GFXII_MODE](#) 1
- #define [BMP_MODE](#) 2
- #define [TXT_MODE](#) 4
- #define [VMEM_AMT_BIT](#) 7
- #define [BLK_SCRN_BIT](#) 6
- #define [IRQ_BIT](#) 5
- #define [SPRITE_SIZE_BIT](#) 1
- #define [SPRITE_MAG_BIT](#) 0
- #define [REGISTER_0](#) 0
- #define [REGISTER_1](#) 1
- #define [REGISTER_2](#) 2
- #define [REGISTER_3](#) 3
- #define [REGISTER_4](#) 4
- #define [REGISTER_5](#) 5
- #define [REGISTER_6](#) 6
- #define [REGISTER_7](#) 7
- #define [NAME_TABLE_ADDR](#) 0x3800
- #define [NAME_TABLE_ADDR_SCALE](#) 10
- #define [COLOR_TABLE_ADDR](#) 0x2000
- #define [COLOR_TABLE_ADDR_SCALE](#) 6
- #define [PATTERN_TABLE_ADDR](#) 0x0000
- #define [PATTERN_TABLE_ADDR_SCALE](#) 11
- #define [SPRITE_ATTRIBUTE_TABLE_ADDR](#) 0x3B80
- #define [SPRITE_ATTRIBUTE_TABLE_ADDR_SCALE](#) 7
- #define [SPRITE_PATTERN_TABLE_ADDR](#) 0x1800
- #define [SPRITE_PATTERN_TABLE_ADDR_SCALE](#) 11
- #define [TMS_TRANSPARENT](#) 0x00
- #define [TMS_BLACK](#) 0x01
- #define [TMS_MEDIUM_GREEN](#) 0x02
- #define [TMS_LIGHT_GREEN](#) 0x03
- #define [TMS_DARK_BLUE](#) 0x04
- #define [TMS_LIGHT_BLUE](#) 0x05

- `#define TMS_DARK_RED 0x06`
- `#define TMS_CYAN 7`
- `#define TMS_MEDIUM_RED 0x08`
- `#define TMS_LIGHT_RED 0x09`
- `#define TMS_DARK_YELLOW 0x0A`
- `#define TMS_LIGHT_YELLOW 0x0B`
- `#define TMS_DARK_GREEN 0x0C`
- `#define TMS_MAGENTA 0x0D`
- `#define TMS_GREY 0x0E`
- `#define TMS_WHITE 0x0F`
- `#define MEM_SIZE (1 << 14)`
- `#define SPRITE_TERM 0xD0`

4.6.1 Macro Definition Documentation

4.6.1.1 BLK_SCRN_BIT

```
#define BLK_SCRN_BIT 6
```

blank screen bit

4.6.1.2 BMP_MODE

```
#define BMP_MODE 2
```

mode bit for bitmap(multicolor) mode

4.6.1.3 COLOR_TABLE_ADDR

```
#define COLOR_TABLE_ADDR 0x2000
```

default address for color table ($R3 * 0x40[2^6]$) 0x2000 address is set when R3 is 0x80.

GFXII can only be 0x0000(0x7F) or 0x2000(0xFF) Init takes care of this, but this can be easily broken if a bad address is used for the color table.

4.6.1.4 COLOR_TABLE_ADDR_SCALE

```
#define COLOR_TABLE_ADDR_SCALE 6
```

value to scale the color table address

4.6.1.5 GFXI_MODE

```
#define GFXI_MODE 0
```

DEFINES VDP MODE DEFINES

mode bit for graphics I mode

4.6.1.6 GFXII_MODE

```
#define GFXII_MODE 1
```

mode bit for graphics II mode

4.6.1.7 IRQ_BIT

```
#define IRQ_BIT 5
```

IRQ bit number

4.6.1.8 MEM_SIZE

```
#define MEM_SIZE (1 << 14)
```

MISC DEFINES

16K of memory: 0 to 0x3FFF (0x4000)

4.6.1.9 NAME_TABLE_ADDR

```
#define NAME_TABLE_ADDR 0x3800
```

VRAM ADDRESS DEFINES

default address for name table ($R2 * 0x400[2^{10}]$) 0x3800 address is set when R2 is 0x0E

4.6.1.10 NAME_TABLE_ADDR_SCALE

```
#define NAME_TABLE_ADDR_SCALE 10
```

value to scale the name table address

4.6.1.11 PATTERN_TABLE_ADDR

```
#define PATTERN_TABLE_ADDR 0x0000
```

default address for pattern table ($R4 * 0x800[2^{11}]$) 0x0000 address is set when R4 is 0x00

GFXII can only be 0x0000(0x03) or 0x2000(0x07) Init takes care of this, but this can be easily broken if a bad address is used for the pattern table.

4.6.1.12 PATTERN_TABLE_ADDR_SCALE

```
#define PATTERN_TABLE_ADDR_SCALE 11
```

value to scale the pattern table address

4.6.1.13 REGISTER_0

```
#define REGISTER_0 0
```

REGISTER DEFINES

mode and external video bits

4.6.1.14 REGISTER_1

```
#define REGISTER_1 1
```

mode, sprite, interrupt, blank, and memory bits.

4.6.1.15 REGISTER_2

```
#define REGISTER_2 2
```

name table address

4.6.1.16 REGISTER_3

```
#define REGISTER_3 3
```

color table address

4.6.1.17 REGISTER_4

```
#define REGISTER_4 4
```

pattern table address

4.6.1.18 REGISTER_5

```
#define REGISTER_5 5
```

sprite attribute address

4.6.1.19 REGISTER_6

```
#define REGISTER_6 6
```

sprite pattern address

4.6.1.20 REGISTER_7

```
#define REGISTER_7 7
```

background, text color

4.6.1.21 SPRITE_ATTRIBUTE_TABLE_ADDR

```
#define SPRITE_ATTRIBUTE_TABLE_ADDR 0x3B80
```

default address for sprite attribute table ($R5 * 0x80[2^7]$) 0x3B80 address is set when R5 is 0x77

4.6.1.22 SPRITE_ATTRIBUTE_TABLE_ADDR_SCALE

```
#define SPRITE_ATTRIBUTE_TABLE_ADDR_SCALE 7
```

value to scale the sprite attribute address

4.6.1.23 SPRITE_MAG_BIT

```
#define SPRITE_MAG_BIT 0
```

sprite magnification bit

4.6.1.24 SPRITE_PATTERN_TABLE_ADDR

```
#define SPRITE_PATTERN_TABLE_ADDR 0x1800
```

default address for sprite pattern table ($R6 * 0x800[2^{11}]$) 0x1800 address is set when R6 is 0x03

4.6.1.25 SPRITE_PATTERN_TABLE_ADDR_SCALE

```
#define SPRITE_PATTERN_TABLE_ADDR_SCALE 11
```

value to scale the sprite attribute address

4.6.1.26 SPRITE_SIZE_BIT

```
#define SPRITE_SIZE_BIT 1
```

sprite size bit

4.6.1.27 SPRITE_TERM

```
#define SPRITE_TERM 0xD0
```

Vertical field can contain a terminator value of 0xD0 to stop sprite processing.

4.6.1.28 TMS_BLACK

```
#define TMS_BLACK 0x01
```

color black

4.6.1.29 TMS_CYAN

```
#define TMS_CYAN 7
```

color cyan

4.6.1.30 TMS_DARK_BLUE

```
#define TMS_DARK_BLUE 0x04
```

color dark blue

4.6.1.31 TMS_DARK_GREEN

```
#define TMS_DARK_GREEN 0x0C
```

register

4.6.1.32 TMS_DARK_RED

```
#define TMS_DARK_RED 0x06
```

color dark red

4.6.1.33 TMS_DARK_YELLOW

```
#define TMS_DARK_YELLOW 0x0A
```

register

4.6.1.34 TMS_GREY

```
#define TMS_GREY 0x0E
```

register

4.6.1.35 TMS_LIGHT_BLUE

```
#define TMS_LIGHT_BLUE 0x05
```

color light blue

4.6.1.36 TMS_LIGHT_GREEN

```
#define TMS_LIGHT_GREEN 0x03
```

color light green

4.6.1.37 TMS_LIGHT_RED

```
#define TMS_LIGHT_RED 0x09
```

register

4.6.1.38 TMS_LIGHT_YELLOW

```
#define TMS_LIGHT_YELLOW 0x0B
```

register

4.6.1.39 TMS_MAGENTA

```
#define TMS_MAGENTA 0x0D
```

register

4.6.1.40 TMS_MEDIUM_GREEN

```
#define TMS_MEDIUM_GREEN 0x02
```

color medium green

4.6.1.41 TMS_MEDIUM_RED

```
#define TMS_MEDIUM_RED 0x08
```

color medium red

4.6.1.42 TMS_TRANSPARENT

```
#define TMS_TRANSPARENT 0x00
```

COLOR DEFINES

transparent for all plans/sprites

4.6.1.43 TMS_WHITE

```
#define TMS_WHITE 0x0F
```

register

4.6.1.44 TXT_MODE

```
#define TXT_MODE 4
```

mode bit for text mode

4.6.1.45 VMEM_AMT_BIT

```
#define VMEM_AMT_BIT 7
```

register 1 bit defines

amount of vram bit

Index

BLK_SCRN_BIT
 tms99XXdefines.h, [28](#)

BMP_MODE
 tms99XXdefines.h, [28](#)

c_tms99XX_ascii
 tms99XXascii.h, [25](#)

checkTMS99XXvram
 tms99XX.h, [18](#)

clearTMS99XXvramData
 tms99XX.h, [19](#)

color1
 u_tms99XX_colorTable::s_cDataNibbles, [5](#)

color2
 u_tms99XX_colorTable::s_cDataNibbles, [5](#)

COLOR_TABLE_ADDR
 tms99XXdefines.h, [28](#)

COLOR_TABLE_ADDR_SCALE
 tms99XXdefines.h, [28](#)

colorA
 u_tms99XX_BMPpixelBlock::s_pDataNibbles, [7](#)

colorB
 u_tms99XX_BMPpixelBlock::s_pDataNibbles, [8](#)

colorC
 u_tms99XX_BMPpixelBlock::s_pDataNibbles, [8](#)

colorCode
 u_tms99XX_spriteAttributeTable::s_dataNibbles, [6](#)

colorD
 u_tms99XX_BMPpixelBlock::s_pDataNibbles, [8](#)

colorReg
 s_tms99XX, [9](#)

colorTableAddr
 s_tms99XX, [9](#)

data
 s_tms99XX_nameTable, [10](#)
 s_tms99XX_spritePatternTable16x16, [11](#)
 s_tms99XX_spritePatternTable8x8, [12](#)
 u_tms99XX_BMPpixelBlock, [13](#)
 u_tms99XX_colorTable, [14](#)
 u_tms99XX_patternTable8x8, [15](#)
 u_tms99XX_spriteAttributeTable, [16](#)

dataNibbles
 u_tms99XX_BMPpixelBlock, [13](#)
 u_tms99XX_colorTable, [14](#)
 u_tms99XX_spriteAttributeTable, [16](#)

earlyClockBit
 u_tms99XX_spriteAttributeTable::s_dataNibbles, [6](#)

getTMS99XXstatus
 tms99XX.h, [19](#)

getTMS99XXvramData
 tms99XX.h, [19](#)

GFXI_MODE
 tms99XXdefines.h, [28](#)

GFXII_MODE
 tms99XXdefines.h, [29](#)

horizontalPos
 u_tms99XX_spriteAttributeTable::s_dataNibbles, [6](#)

initTMS99XX
 tms99XX.h, [20](#)

IRQ_BIT
 tms99XXdefines.h, [29](#)

LICENSE.md, [17](#)

MEM_SIZE
 tms99XXdefines.h, [29](#)

na
 u_tms99XX_spriteAttributeTable::s_dataNibbles, [6](#)

name
 u_tms99XX_spriteAttributeTable::s_dataNibbles, [6](#)

NAME_TABLE_ADDR
 tms99XXdefines.h, [29](#)

NAME_TABLE_ADDR_SCALE
 tms99XXdefines.h, [29](#)

nameTableAddr
 s_tms99XX, [9](#)

PATTERN_TABLE_ADDR
 tms99XXdefines.h, [29](#)

PATTERN_TABLE_ADDR_SCALE
 tms99XXdefines.h, [29](#)

patternTableAddr
 s_tms99XX, [9](#)

README.md, [17](#)

register0
 s_tms99XX, [9](#)

register1
 s_tms99XX, [9](#)

REGISTER_0
 tms99XXdefines.h, [30](#)

REGISTER_1
 tms99XXdefines.h, [30](#)

REGISTER_2
 tms99XXdefines.h, [30](#)

REGISTER_3

- tms99XXdefines.h, [30](#)
- REGISTER_4
 - tms99XXdefines.h, [30](#)
- REGISTER_5
 - tms99XXdefines.h, [30](#)
- REGISTER_6
 - tms99XXdefines.h, [30](#)
- REGISTER_7
 - tms99XXdefines.h, [31](#)
- s_tms99XX, [8](#)
 - colorReg, [9](#)
 - colorTableAddr, [9](#)
 - nameTableAddr, [9](#)
 - patternTableAddr, [9](#)
 - register0, [9](#)
 - register1, [9](#)
 - spriteAttributeAddr, [9](#)
 - spritePatternAddr, [10](#)
 - vdpMode, [10](#)
- s_tms99XX_nameTable, [10](#)
 - data, [10](#)
- s_tms99XX_spritePatternTable16x16, [11](#)
 - data, [11](#)
- s_tms99XX_spritePatternTable8x8, [11](#)
 - data, [12](#)
- setTMS99XXbackgroundColor
 - tms99XX.h, [20](#)
- setTMS99XXblank
 - tms99XX.h, [20](#)
- setTMS99XXirq
 - tms99XX.h, [21](#)
- setTMS99XXmode
 - tms99XX.h, [21](#)
- setTMS99XXreg
 - tms99XX.h, [21](#)
- setTMS99XXspriteMagnify
 - tms99XX.h, [22](#)
- setTMS99XXspriteSize
 - tms99XX.h, [22](#)
- setTMS99XXtxtColor
 - tms99XX.h, [22](#)
- setTMS99XXvramConstData
 - tms99XX.h, [23](#)
- setTMS99XXvramData
 - tms99XX.h, [23](#)
- setTMS99XXvramReadAddr
 - tms99XX.h, [23](#)
- setTMS99XXvramSpriteTerm
 - tms99XX.h, [24](#)
- setTMS99XXvramTableData
 - tms99XX.h, [24](#)
- setTMS99XXvramWriteAddr
 - tms99XX.h, [25](#)
- SPRITE_ATTRIBUTE_TABLE_ADDR
 - tms99XXdefines.h, [31](#)
- SPRITE_ATTRIBUTE_TABLE_ADDR_SCALE
 - tms99XXdefines.h, [31](#)
- SPRITE_MAG_BIT
 - tms99XXdefines.h, [31](#)
- SPRITE_PATTERN_TABLE_ADDR
 - tms99XXdefines.h, [31](#)
- SPRITE_PATTERN_TABLE_ADDR_SCALE
 - tms99XXdefines.h, [31](#)
- SPRITE_SIZE_BIT
 - tms99XXdefines.h, [31](#)
- SPRITE_TERM
 - tms99XXdefines.h, [31](#)
- spriteAttributeAddr
 - s_tms99XX, [9](#)
- spritePatternAddr
 - s_tms99XX, [10](#)
- tms99XX.h, [17](#)
 - checkTMS99XXvram, [18](#)
 - clearTMS99XXvramData, [19](#)
 - getTMS99XXstatus, [19](#)
 - getTMS99XXvramData, [19](#)
 - initTMS99XX, [20](#)
 - setTMS99XXbackgroundColor, [20](#)
 - setTMS99XXblank, [20](#)
 - setTMS99XXirq, [21](#)
 - setTMS99XXmode, [21](#)
 - setTMS99XXreg, [21](#)
 - setTMS99XXspriteMagnify, [22](#)
 - setTMS99XXspriteSize, [22](#)
 - setTMS99XXtxtColor, [22](#)
 - setTMS99XXvramConstData, [23](#)
 - setTMS99XXvramData, [23](#)
 - setTMS99XXvramReadAddr, [23](#)
 - setTMS99XXvramSpriteTerm, [24](#)
 - setTMS99XXvramTableData, [24](#)
 - setTMS99XXvramWriteAddr, [25](#)
- tms99XXascii.h, [25](#)
 - c_tms99XX_ascii, [25](#)
- tms99XXdatatypes.h, [26](#)
- tms99XXdefines.h, [27](#)
 - BLK_SCRN_BIT, [28](#)
 - BMP_MODE, [28](#)
 - COLOR_TABLE_ADDR, [28](#)
 - COLOR_TABLE_ADDR_SCALE, [28](#)
 - GFXI_MODE, [28](#)
 - GFXII_MODE, [29](#)
 - IRQ_BIT, [29](#)
 - MEM_SIZE, [29](#)
 - NAME_TABLE_ADDR, [29](#)
 - NAME_TABLE_ADDR_SCALE, [29](#)
 - PATTERN_TABLE_ADDR, [29](#)
 - PATTERN_TABLE_ADDR_SCALE, [29](#)
 - REGISTER_0, [30](#)
 - REGISTER_1, [30](#)
 - REGISTER_2, [30](#)
 - REGISTER_3, [30](#)
 - REGISTER_4, [30](#)
 - REGISTER_5, [30](#)
 - REGISTER_6, [30](#)
 - REGISTER_7, [31](#)
 - SPRITE_ATTRIBUTE_TABLE_ADDR, [31](#)

SPRITE_ATTRIBUTE_TABLE_ADDR_SCALE, 31
 SPRITE_MAG_BIT, 31
 SPRITE_PATTERN_TABLE_ADDR, 31
 SPRITE_PATTERN_TABLE_ADDR_SCALE, 31
 SPRITE_SIZE_BIT, 31
 SPRITE_TERM, 31
 TMS_BLACK, 32
 TMS_CYAN, 32
 TMS_DARK_BLUE, 32
 TMS_DARK_GREEN, 32
 TMS_DARK_RED, 32
 TMS_DARK_YELLOW, 32
 TMS_GREY, 32
 TMS_LIGHT_BLUE, 32
 TMS_LIGHT_GREEN, 33
 TMS_LIGHT_RED, 33
 TMS_LIGHT_YELLOW, 33
 TMS_MAGENTA, 33
 TMS_MEDIUM_GREEN, 33
 TMS_MEDIUM_RED, 33
 TMS_TRANSPARENT, 33
 TMS_WHITE, 34
 TXT_MODE, 34
 VMEM_AMT_BIT, 34
 TMS_BLACK
 tms99XXdefines.h, 32
 TMS_CYAN
 tms99XXdefines.h, 32
 TMS_DARK_BLUE
 tms99XXdefines.h, 32
 TMS_DARK_GREEN
 tms99XXdefines.h, 32
 TMS_DARK_RED
 tms99XXdefines.h, 32
 TMS_DARK_YELLOW
 tms99XXdefines.h, 32
 TMS_GREY
 tms99XXdefines.h, 32
 TMS_LIGHT_BLUE
 tms99XXdefines.h, 32
 TMS_LIGHT_GREEN
 tms99XXdefines.h, 33
 TMS_LIGHT_RED
 tms99XXdefines.h, 33
 TMS_LIGHT_YELLOW
 tms99XXdefines.h, 33
 TMS_MAGENTA
 tms99XXdefines.h, 33
 TMS_MEDIUM_GREEN
 tms99XXdefines.h, 33
 TMS_MEDIUM_RED
 tms99XXdefines.h, 33
 TMS_TRANSPARENT
 tms99XXdefines.h, 33
 TMS_WHITE
 tms99XXdefines.h, 34
 TXT_MODE
 tms99XXdefines.h, 34
 u_tms99XX_BMPpixelBlock, 12
 data, 13
 dataNibbles, 13
 u_tms99XX_BMPpixelBlock::s_pDataNibbles, 7
 colorA, 7
 colorB, 8
 colorC, 8
 colorD, 8
 u_tms99XX_colorTable, 13
 data, 14
 dataNibbles, 14
 u_tms99XX_colorTable::s_cDataNibbles, 5
 color1, 5
 color2, 5
 u_tms99XX_patternTable8x8, 14
 data, 15
 u_tms99XX_spriteAttributeTable, 15
 data, 16
 dataNibbles, 16
 u_tms99XX_spriteAttributeTable::s_dataNibbles, 6
 colorCode, 6
 earlyClockBit, 6
 horizontalPos, 6
 na, 6
 name, 6
 verticalPos, 7
 vdpMode
 s_tms99XX, 10
 verticalPos
 u_tms99XX_spriteAttributeTable::s_dataNibbles, 7
 VMEM_AMT_BIT
 tms99XXdefines.h, 34