VGA

Video Graphics Array

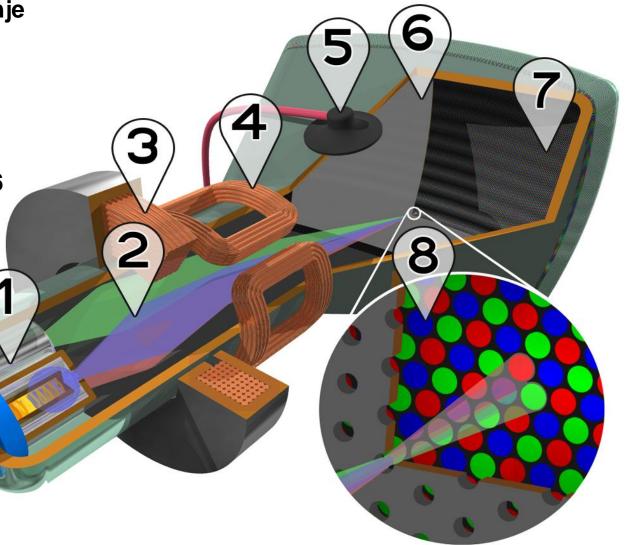
Računarski monitori





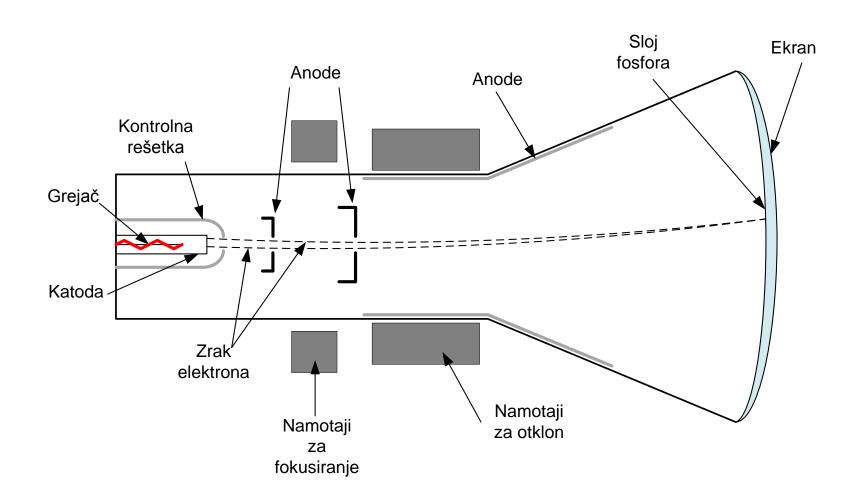
Ekran sa katodnom cevi

- 1. Tri elektronska topa
- 2. Zraci elektrona
- 3. Namotaji za fokusiranje
- 4. Namotaji za otklon
- 5. Anoda
- 6. Maska
- 7. Fosforni sloj sa RGB zonama
- 8. Uvećan prikaz tačke 6





Ekran sa katodnom cevi



TFT LCD ekran – princip rada

- TFT Thin Film Transistor
- LCD Liquid Crystal Display

1: staklene ploče

2&3: polarizatori

4: RGB maska boja

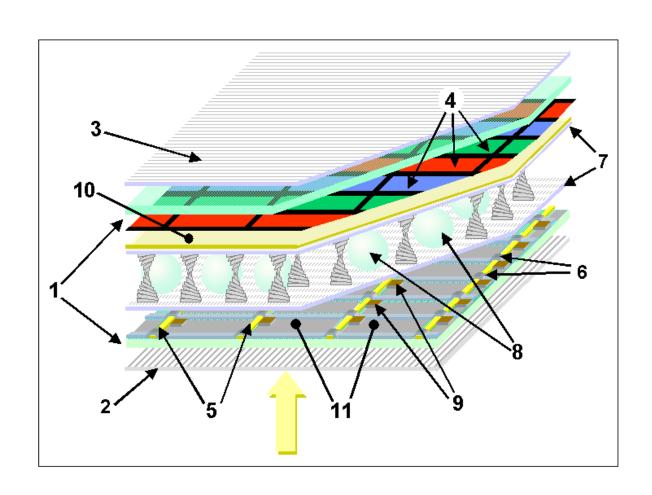
5&6: komandne linije

7: sloj polimera

8: distanceri

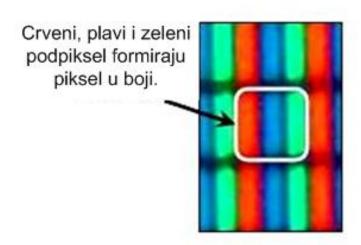
9: tranzistori

10&11: elektrode

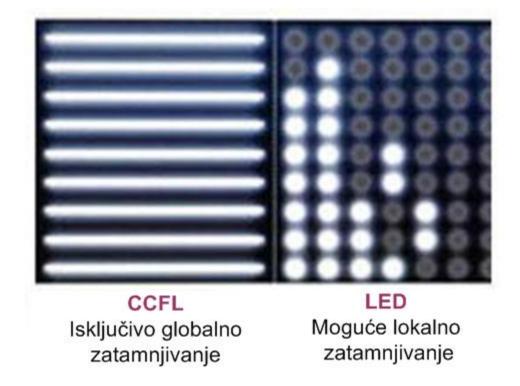


TFT LCD ekran

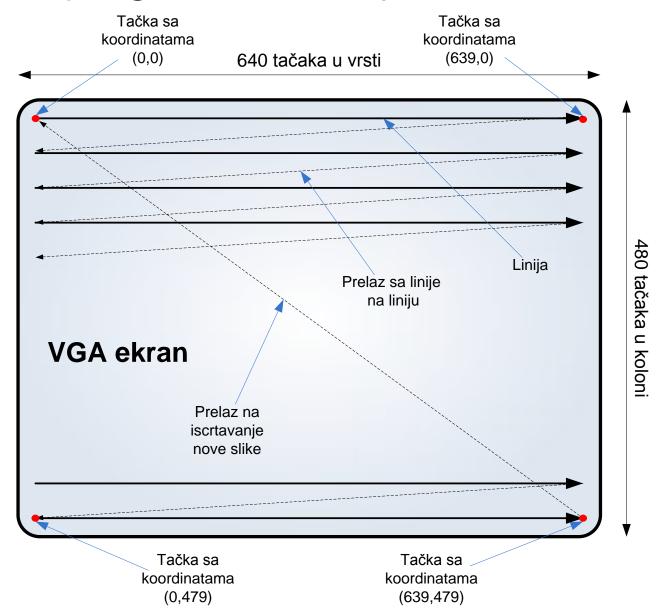
Struktura piksela



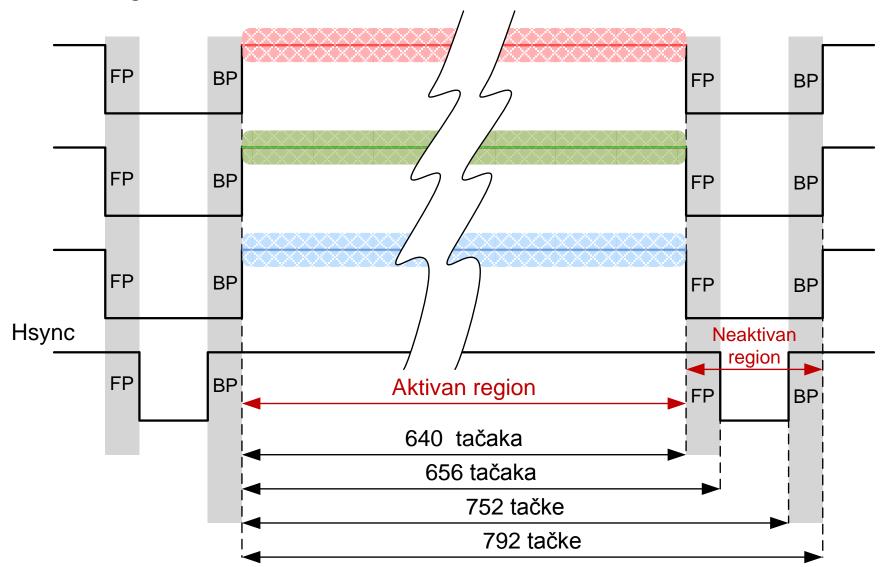
Pozadinsko osvetljenje



VGA sprega - iscrtavanje slika na ekranu



Linija



Ekran

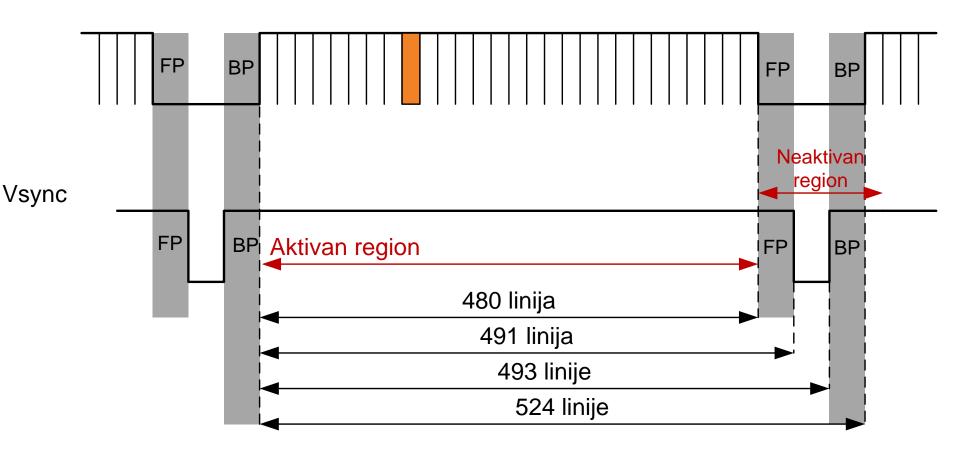


Tabela parametara za sve podržane rezolucije

Rezolucija	Frekvencija takta [MHz]	frekvencija horizontalne sinhronizacije [kHz]	frekvencija vertikalne sinhronizacije [Hz]	ukupan broj tačaka po horizontali	ukupan broj tačaka po vertikali	vrednost parametra resolution _type
64x48	25.17	-	-	-	-	0
640x480	25.17	31.46	60.04	800	524	1
800x600	50	48.08	72.19	1040	666	2
1024x768	75	56.48	70.07	1328	806	3
1152x864	108	67.5	75	1600	900	4
1280x1024	108	63.98	60.02	1688	1066	5

VGA – IF GENERATE

```
res 0: IF ( resolution type = 0 ) GENERATE
             dcm25 i:dcm25MHz PORT MAP(
                                               CLKIN_IN => clk_i

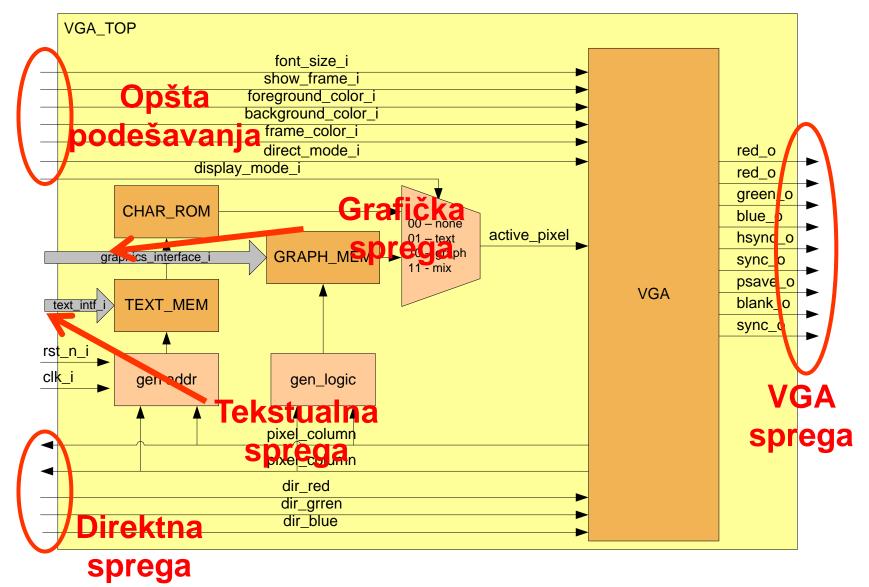
RST_IN => rst_s

CLKFX_OUT => clk_s
                                               CLKIN_IBUFG_OUT => open
CLKO_OUT => open
LOCKED_OUT => locked_s
                                              );
         END GENERATE res 0;
res 1: IF ( resolution type = 1 ) GENERATE
             dcm50 i:dcm50MHz PORT MAP(
                                               CLKIN_IN => clk_i

RST_IN => rst_s

CLKFX_OUT => clk_s
                                               CLKIN_IBUFG_OUT => open
                                               CLKO_OUT => open
LOCKED_OUT => locked_s
                                              );
         END GENERATE res 1;
```

Struktura VGA modula

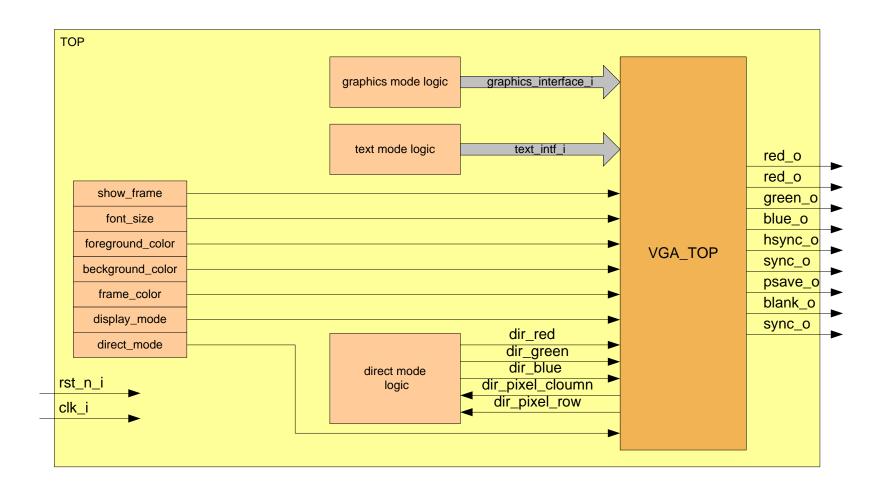




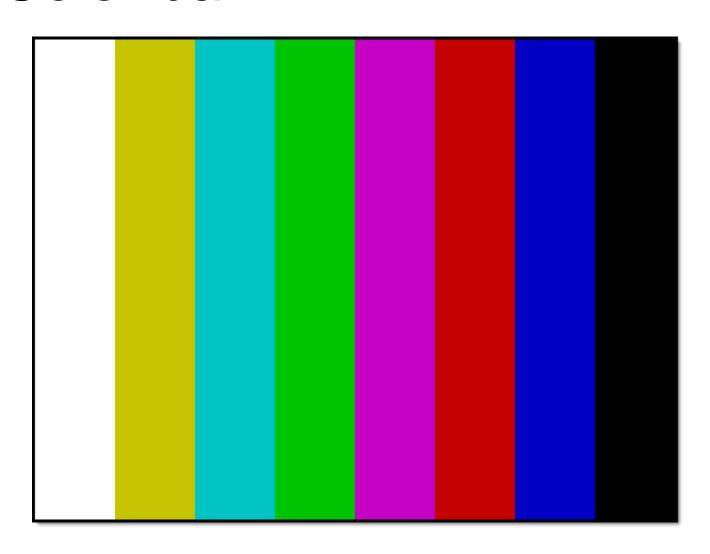
Boje

- Svaka boja je predstavljena sa 8 bita odnosno 24 bita po pikselu
- U direktnom režimu je moguće iskoristiti sve kombinacije boja
- Tekstaulni i grafički režim
 - □ samo dve boje
 - □ Jedan bit po boji

Struktura sistema



1. Color bar



2-3. Tekstualni režim rada

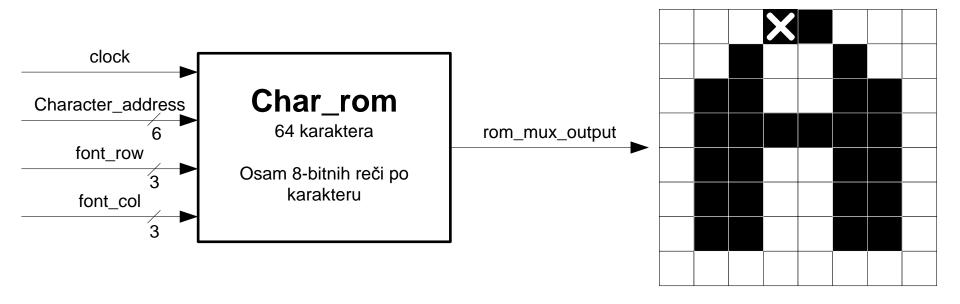
ROM PCI/ISA BIOS (2A69KGOD) CMOS SETUP UTILITY AWARD SOFTWARE, INC. STANDARD CMOS SETUP INTEGRATED PERIPHERALS **BIOS FEATURES SETUP** SUPERVISOR PASSWORD CHIPSET FEATURES SETUP **USER PASSWORD** IDE HDD AUTO DETECTION POWER MANAGEMENT SETUP PNP/PCI CONFIGURATION SAVE & EXIT SETUP LOAD BIOS DEFAULTS EXIT WITHOUT SAUING LOAD PERFORMANCE DEFAULTS † ↓ → ← : Select Item Esc : Quit F10 : Save & Exit Setup (Shift) F2 : Change Color Time, Date, Hard Disk Type...

М

CHAR ROM

- ROM memorija koja sadrži definiciju 64 karaktera
- Dimenzije karaktera su 8x8 piksela
- 8 osmobitnih reči po karakteru
- Detaljna objašnjenja definisanja sadržaja txt_rom-a i samog txt_rom-a se nalaze u praktikumu u poglavljima 3.2 i 3.3.





Adresiranje CHAR ROM-a

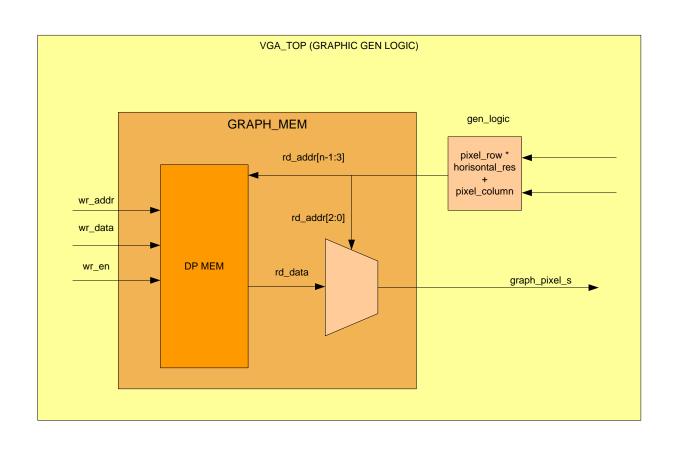
Character address

Font_row

Font_column

	Adre	sa	Podaci o znaku				
	00000	000	00011000				
7	00000	001	00111100				
	00000	010	01100110				
	00000	011	01111110				
	00000	100	01100110				
	00000	101	01100110				
	00000	110	01100110				
	00000	111	0000000				

4-5. Grafički režim rada





Literatura

- Praktikum!
- Aldec Evita VHDL tutorial

Kraj

Pitanja