FACT SHEET 078

Horizontal deflection transistors for 17", 70 kHz monitors

Using Philips' CU15/35 drive transformer and BU4525AF/AX transistor

Most 17" monitor designs for PCs are required to operate up to frequencies of 70 kHz. This fact sheet describes Philips Semiconductors' solution for the horizontal deflection circuit. The circuit uses the new CU15/35 drive transformer from Philips Components and the new BU4525AF/AX deflection transistor from Philips Semiconductors.

The circuit employs a new drive transformer designed specifically for optimum switching of Philips' deflection transistors in multi-frequency applications. The circuit is a complete solution to the horizontal output stage: the 'Hdrive' point can be attached to the output pin of most deflections/sync ICs. The concepts employed in this circuit are explained in the technical paper "Low power, low cost horizontal drive circuits with U15 Cores" (ETV/AN97002).

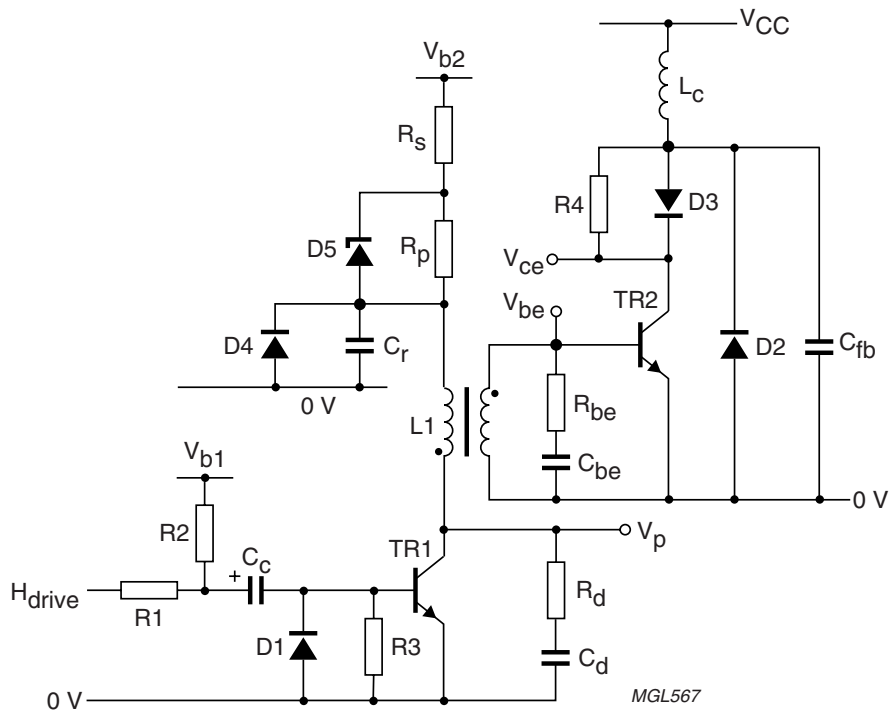

Fig.1 Horizontal deflection circuit for 17", 70 kHz monitors

Component Values: R1 = 100 Ω; R2 = 680 Ω; Vb1 = 12 V; Cc = 10 μF, 16 V; D1 = 1N4148; R3 = 18 K; Rd = 390 Ω; Cd = 10 nF, 63 V; Vb2 = 18 V; Cr = 470 nF; D4 = 1N4148; D5 = BZX79C6V8; Rp = 39 Ω, 1 W; Rs = 27 Ω; Q1 = Philips BC337A; T1 = Philips CU15/35; Q2 = Philips BU4525AF/AX; D3 = BYV28-50; R4 = 47 Ω; Cbe = 150 nF; Rbe = 10 Ω; Lc = 99 μH; Cfb = 5.6 nF, 2kV; D2 = Philips BY359X-1500S; Vcc = 130 V

Fig.2 I_b vs. time (1 A/div, 2 µs/div)

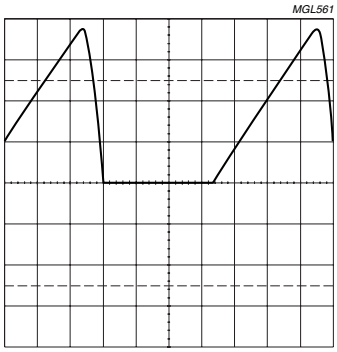

Fig.3 I_c vs. time (2 A/div, 2 µs/div)

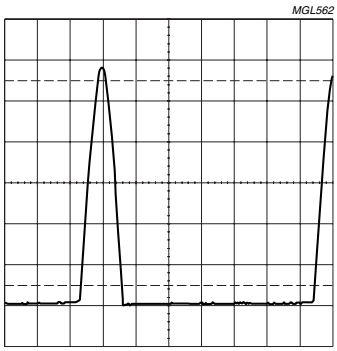

Fig.4 $V_{ce\ max}$ vs. time (200 V/div, 2 µs/div)

Figures 2 to 4 show the important waveforms in the horizontal deflection circuit. The base drive currents (I_{b1} & I_{b2}) have been optimized for an application with a 50% duty cycle running a peak I_c of 7 A at 70 kHz. As can be seen, the peak V_{ce} is 1150 V. The operating conditions are summarized in Table 1.

Table 1 Operating conditions

I_b = 1.6 A
$I_{b\ off}$ = –4.2 A
$I_{c\ max}$ = 7.0 A @ 70 kHz
$V_{ce\ max}$ < 1200 V

This circuit can also be used for the lower frequency modes required, without modification. If the 50% duty cycle is to be altered, then small changes to R_p and R_s may be required to once again optimize the circuit.

The circuit employs some new concepts that have very important benefits for monitor design:

1. Low total dissipation: 'green design'.
2. Low component count.
3. Low-voltage, low-cost components.
4. Flexible design: easy to change for new designs.
5. Reliable circuit for fault and transient conditions.

The concepts discussed in this fact sheet can easily be applied to other multi-frequency monitor applications.

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