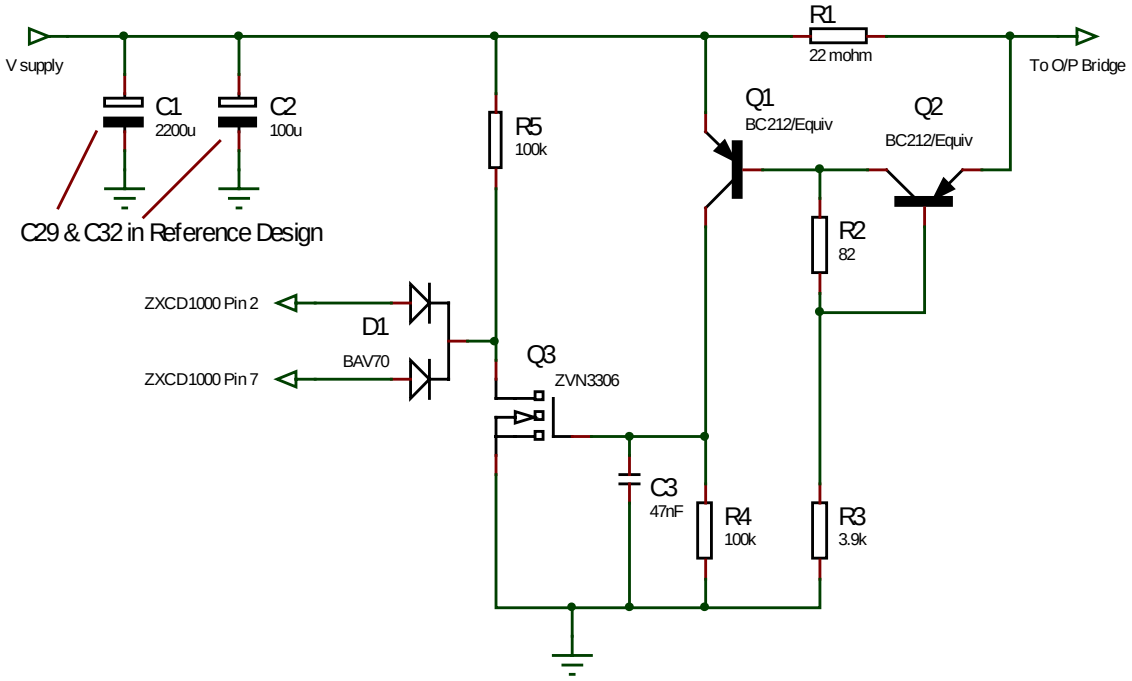
Low Cost Recommended Circuit For Short Circuit Protection of Zetex 25/50 Class D Reference Circuit



The recommended solution for short circuit protection senses the current in a small resistor (R1 - 22 milli-ohm) which is fitted between the existing reservoir capacitors (C1 & C2) and the Output Bridge formed by the four FETs.

When the sensing voltage exceeds the set level, Q1 conducts and charges capacitor C3. Q3 conducts and, via the two diodes formed by BAV70, disables the triangle input to the ZXCD1000.
This immediately reduces the short circuit output current to zero for the length of time taken for C3 to discharge via R4 to a level below the threshold voltage of Q3.

After this time the triangle input to the ZXCD1000 is re-established and if the short circuit still exists the cycle will repeat indefinitely. The circuit operates very quickly and stays in the off condition for a relatively long time (determined by C3 & R4) resulting in a very low average current.

This circuit has been adjusted to operate at currents greater than the peak currents experienced when operating at 25 volts producing 50 watts into an 8 ohm load. It will prevent damage to the output devices from a 'speaker to speaker' short circuit and either speaker terminal to ground. The action of pulling the triangle drives low is to turn 'on' the two lower N-Channel FETs and turn 'off' the two higher P-Channel FETs. It is recommended that the double diode D1 is fitted as close as possible to the ZXCD1000 to reduce stray pickup corrupting the triangle waveform and causing a large increase in the harmonic distortion levels.

The sensitivity of the current limit can be increased or reduced by adjusting the value of R3. Lower resistance values for R3 will result in a higher current limit.

It should be noted that with the current reference design this circuit will not fully protect the output devices from a speaker short circuit to ground when the supply is initially applied. The problem can be effectively reduced by changing the coupling capacitors on the reference design (C16, C17, C19, C20) from 1uF to 100nF. We do not expect the performance to be adversely affected when operating within power levels prior to overload.

Transistors Q1 & Q2 can be BC212 or 2N4403 or any similar type. The characteristics of these parts are not critical to the operation of the circuit.

Issued June 22nd 2001