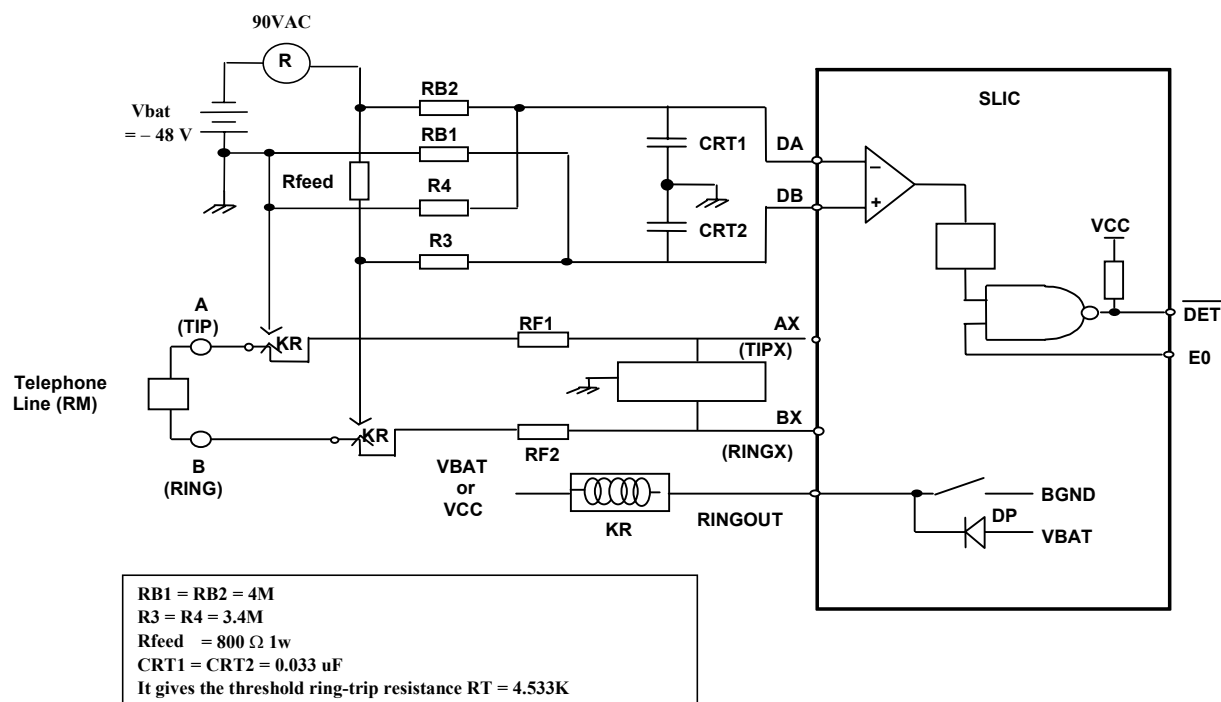


APPLICATION NOTE

Several of Zarlink's SLIC products offer DA/DB pins that allow external input signals to be applied to the SLIC. These pins allow the user to connect to off-board custom-built ringing circuitry.

An example of the type of circuitry recommended is similar to what is shown in Figure 1.

Figure 1. External Ringing Circuitry

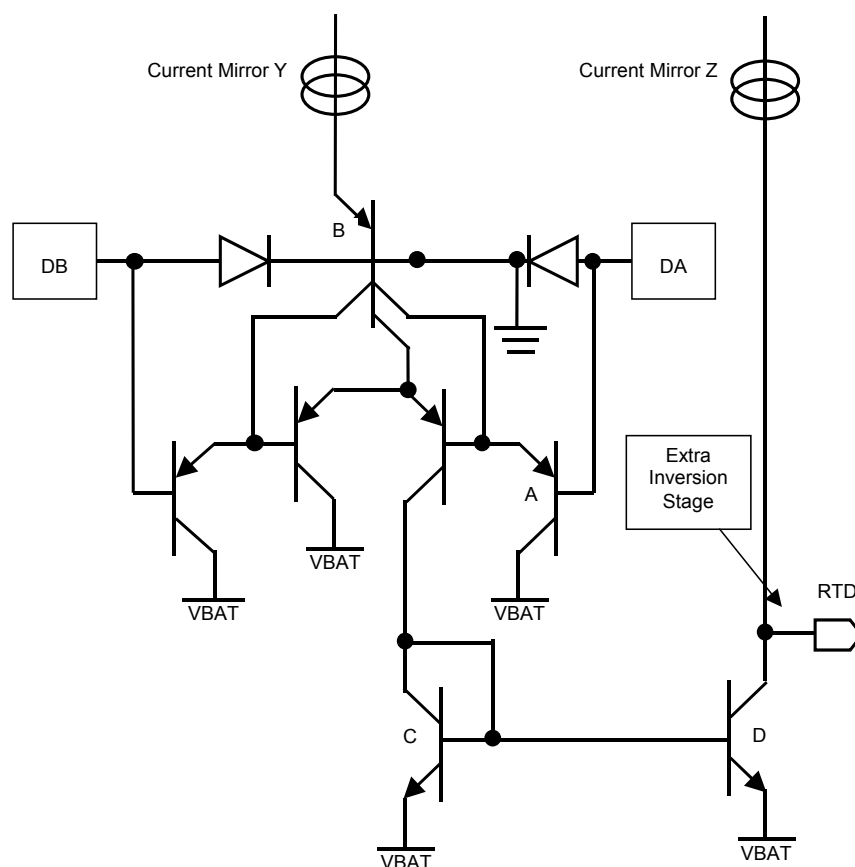


This allows operation in half-battery, with a DA/DB delta of $-1.8\ V$ when on-hook.

There are two different internal SLIC configurations of the DA/DB circuitry. These are functionally equivalent when used in a standard application. However, if the ring-trip comparator is used in a different way, different behavior is seen if the voltages at DA and DB operate very close to BGND. The following describes each circuit and the resulting behavior when operating these inputs near to ground.

The following circuitry applies to these devices:

Am7942, Am7943, Am7944, Am7945, Am7946, Am79467, Am79467-X, Am7947, Am7949, Am795xx, and the Am79M5xx.

Figure 2. DA/DB Circuitry Internal to SLIC (Newer) Devices

The way this circuit operates is:

During a non-tripped mode:

1. DB is less than DA.
2. The voltage on DB turns on the DB half of this comparator.
3. This forces all the current going through transistor B into transistors A and C.
4. The current mirror formed by transistors C-D shunts all the current from current mirror Z away from "RTD", preventing a detect signal from occurring.

During a tripped mode:

1. DA is less than DB.
2. The voltage on DA turns on the DA half of this comparator (stealing the current from the DB half).
3. This forces all the current going away from transistors A and C.
4. The current mirror formed by transistors C-D turns "off" and all of the current from current mirror Z goes into "RTD" and generates a detect signal.

Typical Voltage required on DB for circuit to operate at temp = 25°C:

$$DB < -(V_{SAT} \text{ of transistor B}) - (V_{BE} \text{ of Transistor A}) \cong -(0.20 \text{ V}) - (0.60 \text{ V}) \cong -0.8 \text{ V}$$

⇒ Assume -1.00 V with margin for internal IR drops.

The following circuitry applies to these optimized designs:

Am7920, Am7922, Am7924, Am79485, and the Am79489.

The schematic diagram illustrates a 4-bit DAC architecture. It features a central resistor ladder with four nodes labeled A, B, C, and D. Node A is connected to a current source labeled 'Current Mirror Z' and a resistor 'RTD'. Node B is connected to a current source labeled 'Current Mirror Y'. The ladder is terminated at both ends by resistors connected to a common 'VBAT' supply. The output of the DAC is taken from node B, which is also connected to a 'DB' (Digital-to-Analog) block. The input of the DAC is taken from node A, which is also connected to a 'DA' (Digital-to-Analog) block. The circuit is powered by a 'VBAT' supply, which is connected to the gates of the transistors in the ladder and the current mirrors.

In Figure 3, when DB moves too close to ground, then the DB half of the comparator turns off independent of the voltage on DA. This results in no current flowing in transistor C and the device appearing to ring trip as transistor D is no longer able to shunt the current from mirror Z to ground. The voltage on DA will not affect this behavior. Therefore, these inputs should be operated between -1.25 V and VBAT potential.

Even with this design, the same operating range of -1.25 V to VBAT is recommended for DA and DB to ensure correct comparator operation.



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