Automotive Security Systems and RF Transistor Products

3V Distress Beacon

The majority of modern automotive alarms employ coded RF systems that key a VHF carrier wave with a unique (or at least, one of many) code. The encoding ICs available are able to keep component count to a minimum, and for efficient, cost-effective and non-critical operation, a high performance RF driver is therefore essential.

The transmitter circuit shown, is typical of such systems. It requires a device with tightly controlled DC and RF parameters, as there is no provision for component variability.

World-wide, different frequencies have been allocated for this application and this defines device selection. For the UK where a band at 418MHz has been set, the ZTX325 with a peak F<sub>T</sub> of 3.2GHz is ideal. The US band of 314MHz is well served by the Zetex MSH10 with an F<sub>T</sub> of 1.6GHz peak and various European frequencies in the range of 200-300MHz are covered by the ZTX321 with an F<sub>T</sub> peaking at 880MHz.

Essential characteristics of personal distress beacons (as used in hazardous areas by fire-fighters, mountain and air/sea rescue, etc.) are that they are compact, reliable and have good endurance capabilities. This leads to two cell supply designs whose efficiency is often degraded by the switching performance of the converter transistor.

RF output power is normally regulation limited to 0.5 -1W. Supply currents of 10 - 20mA are necessary to provide these levels due to antenna shrouding by the operators hand. At these current levels careful attention must be paid to available RF gain, F<sub>T</sub> profiles, and biasing. The aforementioned transistors have all been characterised in this respect, and ‘s’ parameters are available for the BFS17 and MSH10.

Circuit action is as follows: The converter circuit charges up C2 until the resistive potential divider (1M/120k) provides enough voltage to break down the diac D2. The triac TR1 then switches C3’s charge into the pulse transformer, which ionises the tube into conduction using the charge on C2. The cycle then repeats. For slow/infrequent flash rates, small modifications to the circuit allow the converter section to shut down when the reservoir capacitor is charged, thus providing an efficiency enhancement.

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A high gain low saturation voltage ZTX688B allows this 3V powered personal alarm beacon to operate with an efficiency of more than 70%, maximising flash brightness and battery life. This efficiency is obtained by combining an energy saving flyback design with the low on-state losses and low base drive requirements of the Zetex matrix based ZTX688B (which features a saturation voltage of 0.1V at 1A with only 5mA base drive). The small size of the E-Line (TO92 style) package helps to keep unit size to a minimum. Battery life is further extended by the design’s capability of operating with supplies down to 1V.

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