The Islamia University of Bahawalpur

High Voltage Engineering

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Project Report

Title: Mobile Phone Detector

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Basic principle:

The basic principle behind the Cell Phone Detector circuits is to detect the RF Signals. In the Schottky diode circuit, the Schottky Diode is used to detect the cell phone signal as they have a unique property of being able to rectify low frequency signals, with low noise rate. When an inductor is placed near the RF signal source, it receives the signal through mutual induction. This signal is rectified by the Schottky diode. This low power signal can be amplified and used to power any indicator like an LED in this case.

Introduction:

A Phone Detector is a device that identifies the presence of active mobile phones in a specific area by detecting their radiofrequency signals. It plays a crucial role in enhancing security, privacy, and enforcing compliance in various environments.

Objective:

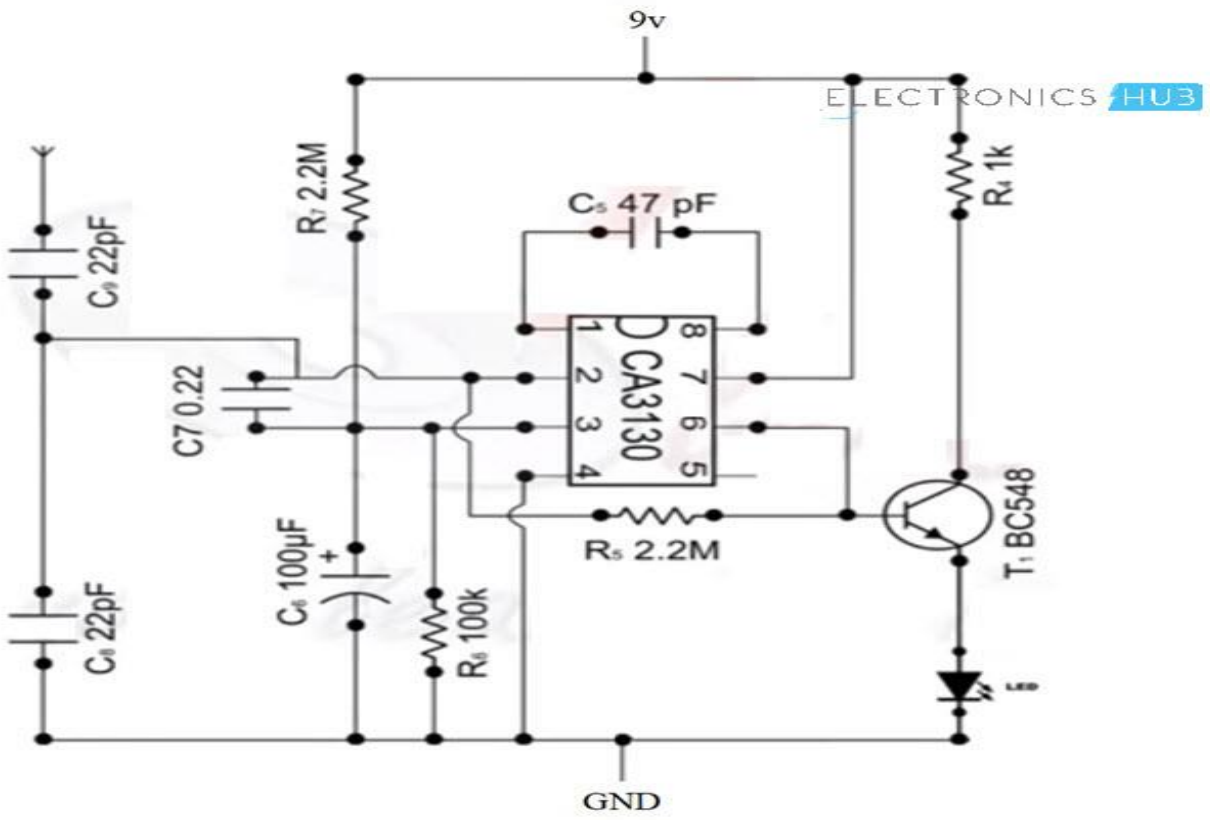
The objective of the "Mobile Phone Detector" project is to create a device or circuit that can accurately identify the presence of active mobile phones within a specified range and provide a visual or audible alert, serving security, privacy, and compliance purposes.

Components:

Following components are required for mobile detector:

- CA3130 Op-Amp
- Resistors – 2.2MΩ x 2, 100KΩ, 1KΩ
- Capacitors – 22pF x 2, 0.22nF, 47pF, 100µF
- BC548 NPN Transistor
- LED
- Antenna
- Connecting Wires
- Breadboard
- 9V Battery

Circuit diagram:



Components Description:

CA3130 Op-Amp:

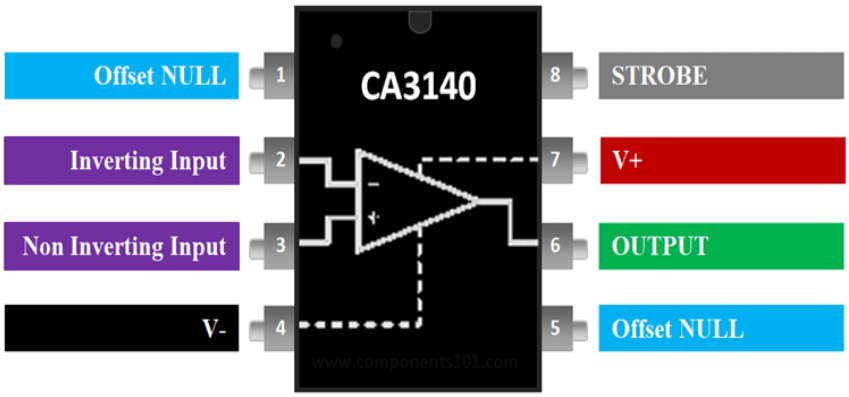
The CA3130 Op-Amp functions as an amplifier and signal processor. Its primary role is to amplify an input voltage and provide an output voltage that is a multiple of the input. It does this while maintaining a high input impedance (it doesn't draw much current from the source), low input bias current, and low offset voltage (for accuracy).

In This specific circuit described earlier, the CA3130 Op-Amp is used as an RF signal detector. It reads the input signal from the antenna and amplifies it. When the input signal rises (indicating the presence of an RF signal, like from a cell phone),

the Op-Amp responds by producing a corresponding output voltage change. This change is then used to activate an LED, serving as a visual indicator that an RF signal has been detected. So, in this context, the CA3130 Op-Amp plays a crucial role in the detection and signaling of RF signals.

PINs of CA3130

Non-Inverting Input (PIN 3): This pin is where the non-inverting input signal is applied. It's often labeled with a + sign on schematics.



Inverting Input (PIN 2): This pin is where the inverting input signal is applied. It's usually labeled with a - sign on schematics.

Output (PIN 6): This pin delivers the amplified signal. It's where you measure the output voltage of the op-amp.

Power Supply (PINS 4 and 7): These pins connect to the power supply, providing the necessary voltage to operate the op-amp. Pin 4 is the negative supply (-Vcc), while pin 7 is the positive supply (+Vcc).

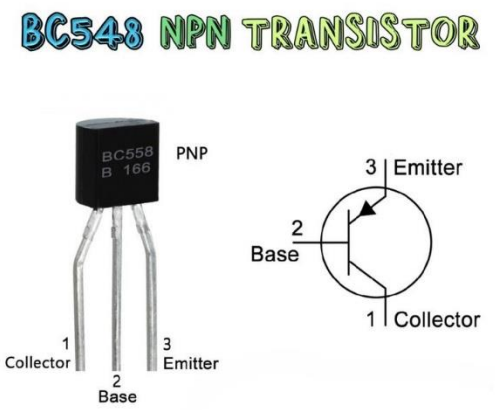
Offset Null (PINS 1 and 5): These pins can be used for offset nulling to minimize any input offset voltage. This feature helps to balance out any inherent differences between the inverting and non-inverting input terminals.

Frequency Compensation (PIN 8): This pin is used for frequency compensation in some op-amp models.

BC548 NPN Transistor:

The BC548 NPN transistor functions as an electronic switch or amplifier. When used as a switch, it controls the flow of current between its collector and emitter terminals based on the current applied to the base terminal. When a small current flows into

the base, it allows a larger current to pass from collector to emitter, effectively turning the transistor “on.” When there is no base current, the transistor is in the “off” state, and current cannot flow.



In amplification applications, the BC548 amplifies a small input current at its base and allows a much larger current to flow between the collector and emitter terminals. This amplification is useful for increasing the power of a weak signal, making it suitable for tasks such as signal amplification in electronic circuits.

The specific function of the BC548 transistor in a given circuit depends on how it’s connected and biased within that circuit.

Working:

In this circuit, the operational amplifier (Op-Amp) serves as the RF signal detector, while the transistor component functions as an indicator. The combination of capacitors and the antenna plays a crucial role in detecting RF signals generated when a cell phone initiates or receives a call or sends or receives text messages.

The operational amplifier, or Op-Amp, operates by translating variations in input current into corresponding voltage changes at its output. When an RF signal is detected, this voltage shift activates an LED, providing a visual indication of signal detection. This setup effectively allows the circuit to sense and respond to the presence of RF signals generated during cell phone communication activities.

Conclusion:

Our “Mobile Phone Detector” project involves creating a circuit to spot active mobile phones by picking up their radiofrequency signals. It uses components like the CA3130 Op-Amp, BC548 NPN Transistor, resistors, and capacitors to trigger an LED when an RF signal is detected.

This project is essential for maintaining security and privacy in locations where mobile phone usage needs monitoring, such as exam halls and theaters. It highlights

the fusion of electronics and telecommunications to address contemporary challenges.