We-Vibe Classic Operational Description

The main unit use BT protocol with the following parameters:

- Operating frequency range: 2402-2480 MHz.
- Modulation type: Gaussian frequency shift keying (GFSK)
- Channels are 2MHz apart
- 3 advertising channels, 37 Data channels
- Modulation index of 0.5

Antenna type is simple 50 ohm whip antenna 1/4 wavelength

Charging Control Section

When the processor port P1.7 is set low, charging is enabled. This low signal turns Q11 OFF, allowing the gate of Q12 to be pulled high through R12, turning Q12 OFF, and allowing R16 to pull down the gate of Q10. This turns Q10 fully ON, and allows any charging voltage on C11 to flow into the battery

If the processor pin P1.7 is high, Q11 is turned ON, pulling the gate of Q12 low, turning it ON. This short the gate of Q10 to its own source pin, keeping it turned OFF, disallowing any current to be delivered to the battery.

The voltage on the battery is read by the processor through the voltage divider R17/R18, and filtered through C15. C15 isn't as much of a filter as it is a storage element. The input impedance of the processor pin is typically in the mega-ohm range, but when it is sampling an analog value, it drops to 200kΩ. Without the capacitor, this causes the voltage read to droop badly. We only read this value once per second so there is plenty of recovery time, even through the 1MΩ/100nF filter.

Battery voltage is filtered with R19/C14. After R19, the voltage is dropped through the body diode of Q13 whose gate is permanently tied to the source, keeping it OFF. This applies a voltage drop of about 0.5 – 0.6 volts. Q14 performs the same function, except its gate is controlled by the processor pin P1.5. As the battery voltage rises and falls, the processor controls this extra voltage drop to ensure a safe supply voltage to the processor during charging where battery voltage can rise to 4.2 volts. When the voltage is below 4.0 volts, the drop is turned OFF, giving the processor maximum signal possible. Resistor R101 ensures that in a totally dead battery case, that the voltage drop is disabled, allowing the processor to come back to life as quickly as possible.

Motor Control Outputs

Two special outputs from the processor are used to drive the motors: P0.4, and P0.5. These are connected to a hardware PWM within the processor and are capable of running autonomously without processor interference. Each output drives a MOSFET which pulls one side of a motor to ground; the other side of that motor is connected to the battery. All current through both motors is limited by a PTC fuse R32. In the case of a shorted motor, the current draw from the battery is limited to a safe level. When the motor is turned OFF by bringing the control line low, any back EMF spikes are absorbed by the associated diode D30/D31.

Temperature Sensor

In order to save energy, the thermistor is powered from a controllable port P0.0. However, since this output is not a deterministic value, we have to read the voltage of this pin via P0.1. The thermistor voltage read at P0.2 is normalized by the voltage read at P0.1 so that the final output is irrelevant of supply voltage.

Push-Button Switch

The control switch is read by the processor at P1.6.

Sheet 2: RF and Power Connections

The connections on this page are the same as on the remote control, right down to the reference designators. Please refer to the remote control section for the circuit description.

Processor Pin Assignments

The connections to the processor are as follows:

Port	Direction	Type	Function
P0.0	Output	Digital	Thermistor power
P0.1	Input	Analog	Thermistor power read-back
P0.2	Input	Analog	Thermistor value
P0.3	Input	Analog	Battery measurement
P0.4	Output	Digital	Primary motor output
P0.5	Output	Digital	Secondary motor output
P0.6	Input	Digital	Charger detection
P1.5	Output	Digital	Voltage drop control
P1.6	Input	Digital	Push-button switch
P1.7	Output	Digital	Charger control