Theory of Operation

This amplifier is made up of 3 parts: power supply circuit, transmitting circuit and receiving circuit. It is used to amplify the signal to and from PCS or cellular band cellphone.

Power supply circuit uses a 7805 to regulate the input DC12V voltage to DC 5V. It uses a diode to protect the circuit from input with reverse polarity. Also, a switch and a power-on indication lamp are used. The switch turns on and off the green lamp as well as the whole circuits board.

Inserted as part of base station and cellphone power control loop, the transmitting circuit amplifies the RF signal from cellphone large enough to meet tower requirements. Cellphone adjusts its output adaptively according to the commands from base station. The signal from cellphone first goes into a diplexer (HITACHI SLF-190LB-K) which separate the frequency between 800MHz and 1900MHz, and then goes into another diplexer (TOKO TDPH-1880L-13 for 1900MHz, TDPF-836E-13 for 800MHz) which separate the signal from receiving path, then the filtered signal goes into a power amplifier with gain control (2174 for 1900MHz, 2173 for 800MHz). The amplifier will amplify the signal based on the input signal strength. After the amplifier, the signal will goes into the other diplexer and then goes to the antenna.

The receiving circuits amplify the RF signal from antenna and improve cellphone's sensitivity. The dual-band antenna has 3 or 5 dBi gain, it gathers the signal and send it to the diplexer (HITACHI SLF-190LB-K), which separates the frequency between 800MHz and 1900MHz and then goes into another diplexer(TOKO TDPH-1880L-13 for 1900MHz, TDPF-836E-13 for 800MHz) which separates the receiving signal from transmit signal. The filtered signal then goes into 2-stage LNA. Each stage is mainly made up of a 54143, which is a LNA IC with high quality. The output signal will go into the second diplexer and then to a SMA socket, which connected to a cable that attached to cellphone.

In summary, this device will amplify dual-band signal bi-directionally, thus improve cellphone reception and increase coverage area.