



PowerMinder Power Management and Scheduling

Tech Note – TN1020
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Purpose

This TechNote describes the software and optional hardware configuration required to use Ctek's PowerMinder feature set. PowerMinder significantly reduces power consumption in selected SkyRouter models by managing a schedule of when the SkyRouter will be actively connected to the network and when it can be placed in a low power standby mode of operation. Designers of solar and battery powered applications will find this feature particularly useful to minimize the solar panel and battery requirements at each remote site.

Applicability

PowerMinder is available for all SkyRouter models. The external PowerMinder module Model W1401S can be used on SkyRouter Models Z4200U, Z4300U, and Z4400U.

Features

PowerMinder configuration application

- Creates schedules for full power vs. reduced power operation
- Same schedules used with firmware only and firmware/hardware power reduction

External PowerMinder Module W1401S

- Uses PowerMinder schedules created above
- Reduce standby power to less than 100 micro-amps
- Provides input voltage level measurement for battery status

Overview

The PowerMinder feature set consists of an application program that is available with the TCOPlus administration package and an optional hardware component, the W1401S that provides the maximum power reduction control. With PowerMinder a SkyRouter can be automatically operated in one of three power modes as shown below:

Mode	SkyRouter Operation	Notes
Full Power	Normal SkyRouter operation. SkyRouter is fully operational across all features and functions.	
Reduced Power Standby Mode	The SkyRouter cycles between Full Power mode and a standby reduced power mode based on a schedule configured in the SkyRouter's PowerMinder application. In reduced power mode the SkyRouter powers down the cellular radio, LED indicators, and I/O connections. The SkyRouter's processor continues to run and will restore the unit to full power operation based on the PowerMinder schedule.	<p>Indications: All LEDs off except that the Link LED blinks red every 15 seconds.</p> <p>Power Consumption: Approximately 100 ma during standby for Z series models.</p>
Maximum Power Reduction Mode	The SkyRouter cycles between Full Power mode and being completely powered down. This mode of operation requires the W1401S external PowerMinder module which is programmed through the SkyRouter to schedule power on/off based on the PowerMinder schedule.	<p>Indications: All LEDs off. Unit is off.</p> <p>Power Consumption: Approximately 60 μa (micro-amps) during standby.</p>

Configuration

The PowerMinder configuration screen resides under the Tools selection on the SkyRouter's top level menu. See Figure 1 below:

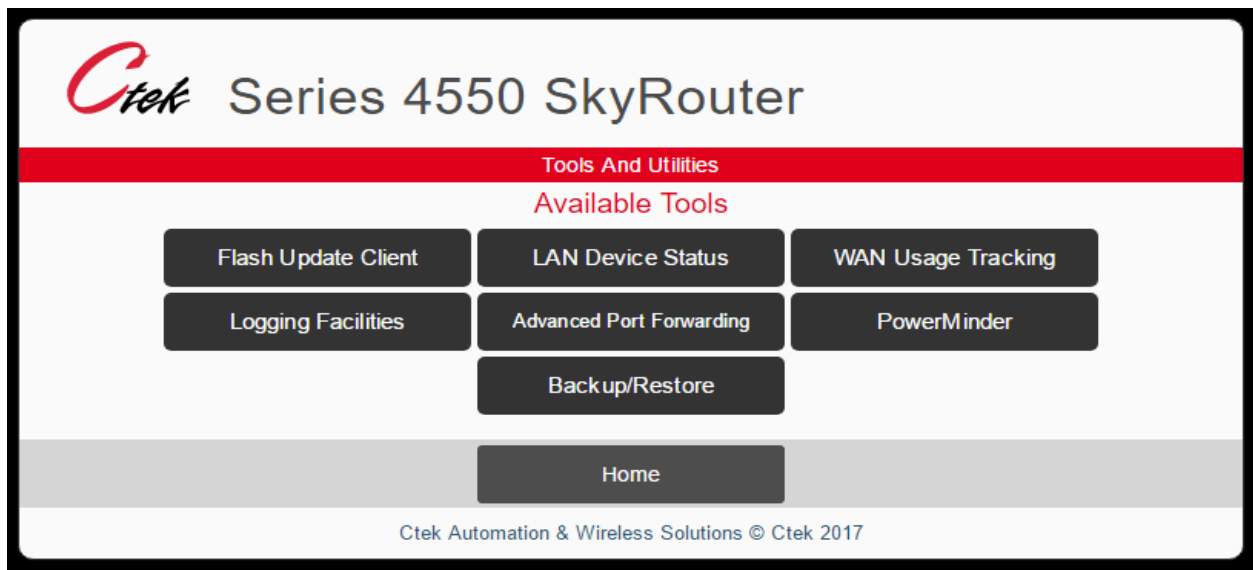


Figure 1 Tools Menu (TCOPlus installed)

When the PowerMinder selection is picked a scheduling/configuration screen is presented. The configuration screen functions in the same way regardless of whether the external PowerMinder module is connected or not. The only visible difference between configuring a unit using internal PowerMinder logic and configuring one using the hardware controller will be a message above the schedule panel. If the W1401 is not connected the message will say "Using Internal PowerMinder Logic" whereas a configuration screen on a unit with the hardware controller will display "Using External PowerMinder Module" as shown in Figure 2 below.

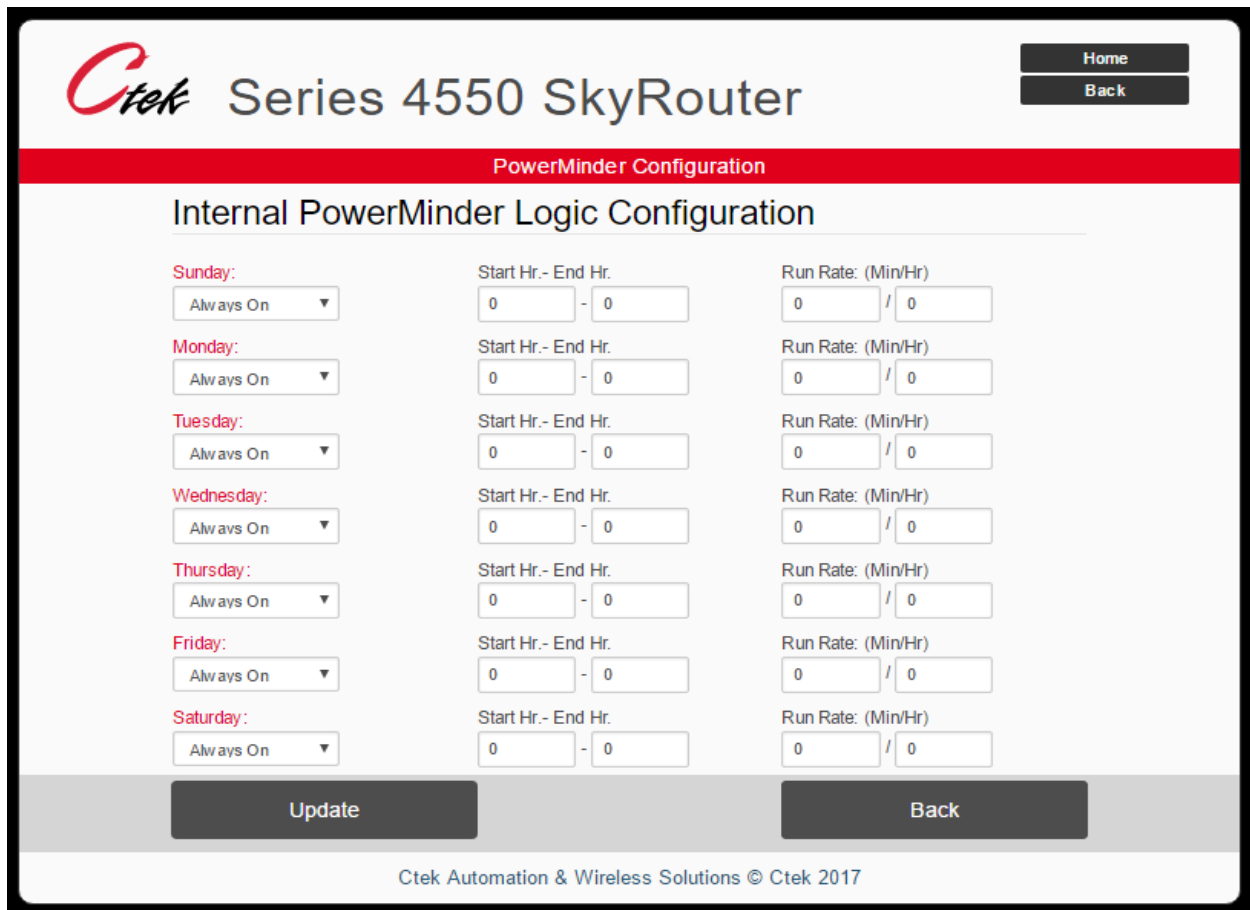


Figure 2 - Configuration Screen With External Module

The configuration screen allows the user to build a schedule for each day of the week. The schedule will repeat each week as defined. Each row in the schedule is identical. Using the Sunday row as an example the field definitions are as follows:

Always On - A pull down to establish the high level scheduling choices for this day. Available settings are Always On, Always Off, or Scheduled. The remaining fields in the row are relevant only if this field is set to Scheduled.

Note - The schedule defines intervals when the SkyRouter will be placed in full power mode and be available for normal operations.

From Hour - Defines the beginning hour of the schedule. This setting is based on a 24-hour clock.

Through Hour - Defines the last hour of the daily schedule, i.e. the last hour during that day that the SkyRouter will be powered up and operational.

In Hour Increments - Within the confines of the beginning and ending hour this field defines the interval between power up cycles.

For Minutes - Defines the duration of an individual power up cycle.

Example - If the Sunday row contained [Scheduled, 07, 14, 2, 12] the row would read "Sunday scheduled from 0700 through 1400 in two hour increments of 12 minutes each]. This schedule would cause the SkyRouter to become active at the following times:

0700 - 0712

0900 - 0912

1100 - 1112

1300 - 1312

SkyRouter time is synchronized with the serving network's time every hour and maintained locally when the SkyRouter is not connected to the network.

Input Voltage Monitor

When the W1401 external PowerMinder module is used the input voltage is displayed on the SkyRouter's top level menu screen as shown in Figure 3. The input voltage display line will be just below the firmware release level. If the external PowerMinder module is not used this display line will not be present.

*****Missing Screen shot*****

Figure 3 Top Level Menu With Input Voltage Displayed

System Connections

Figure 4 shows a basic interconnection diagram. The PowerMinder module is connected to the power source through its two pin green connector. The PowerMinder module is connected to the SkyRouter by way of four flying leads. The red and black leads are power and ground respectively and the blue and white leads provide RS485 communications, blue being transmit/receive + and white being transmit/receive -. The PowerMinder

module has a fixed RS485 address of 00. This address should not be used by other devices on the same RS485 string. Additional details on the SkyRouter connections can be found in the next section.

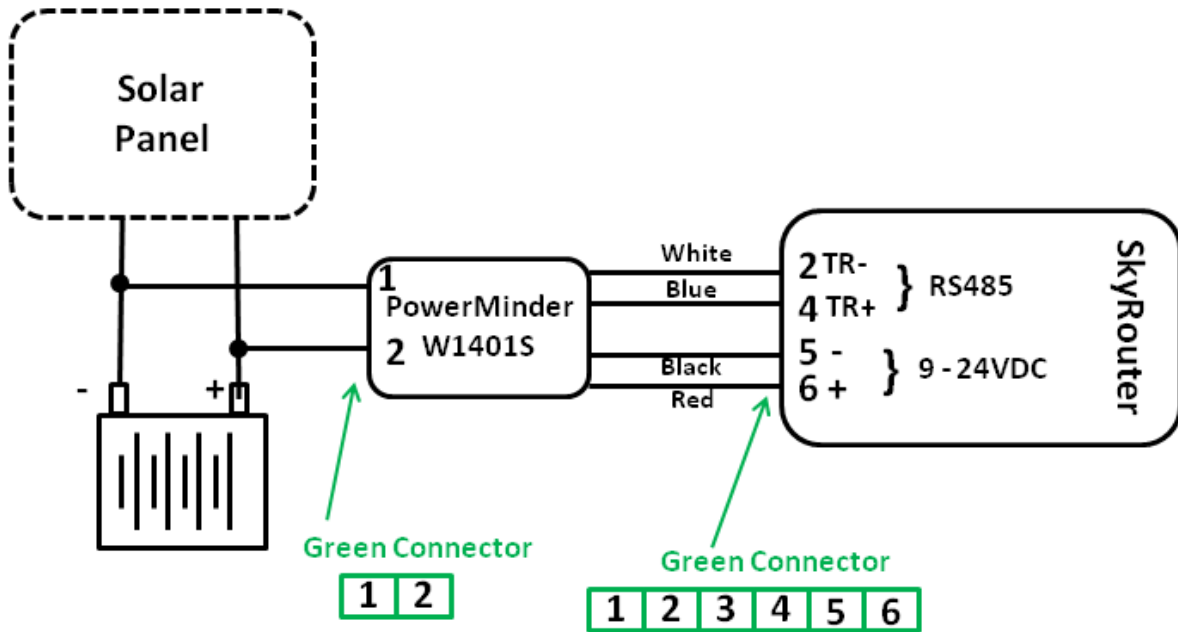


Figure 4 - Basic Interconnect Diagram

Detailed SkyRouter Connections Z4400 and older

Figure 5 shows the connections available on a Z Series SkyRouter that can be used to interconnect with I/O modules.

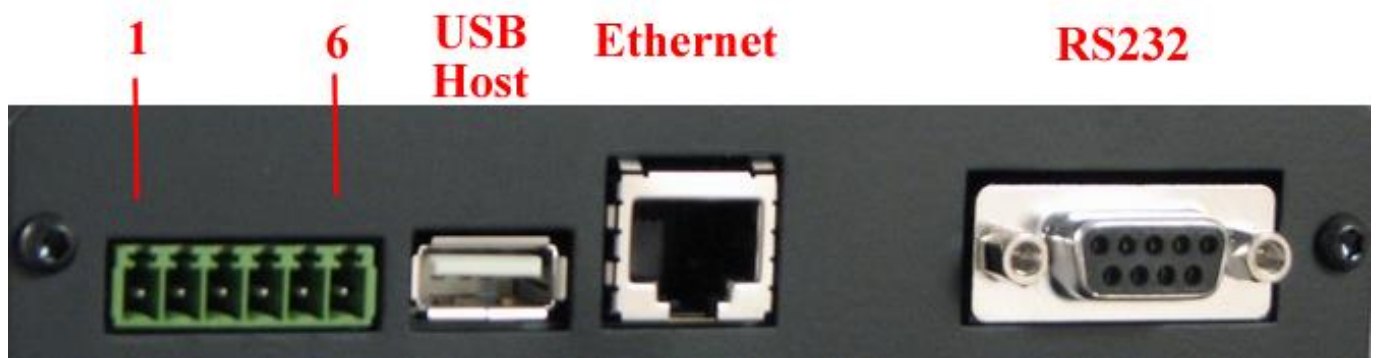


Figure 5 - Z4200U/Z4300U/Z4400U Connections

Connector J1 (green connector) supports four separate functions, power, relay contact closure detection, relay driver output, and the RS-485 serial port. Contact closure pins 2 and 4 are shared with the RS485 serial port. To option remove the circuit board and locate the 3-pin headers JP1 & JP2 behind the green connector. Facing the end of the board containing the green connector JP1 and JP2 should have jumpers center to right to use the discrete I/O (Din, Dout), and JP1 and JP2 should have jumpers center to left to use the RS-485 serial port. Auxiliary serial port parameters (baud, parity, etc.) are set using the RS232/485 configuration screen. **From the factory the unit ships with the auxiliary RS-485 serial port enabled and configured as a master device.** The J1 pin out configuration is as follows:

TERMINAL BLOCK PIN	JP1 & JP2 (INTERNAL) CENTER TO RIGHT	JP1 & JP2 (INTERNAL) CENTER TO LEFT
PIN 1	DIN SRC – DISCRETE INPUT SOURCE	
PIN 2	DIN – DISCRETE INPUT (SEE APPENDIX A)	TR- OF RS-485 SERIAL PORT ¹
PIN 3	DOUT GND – DISCRETE OUTPUT GROUND	GROUND OF RS-485 SERIAL PORT ²
PIN 4	DOUT - DISCRETE OUTPUT ³	TR+ OF RS-485 SERIAL PORT ¹
PIN 5	POWER SUPPLY GROUND	POWER SUPPLY GROUND
PIN 6	POWER SUPPLY +12VDC	POWER SUPPLY +12VDC
NOTE 1	CONNECT A 120 OHM RESISTOR ACROSS PINS 2 --> 4 FOR MULTI-DROP CONFIGURATIONS	
NOTE 2	AVAILABLE AS A THIRD WIRE GROUND FOR USE IN NOISY ENVIRONMENTS	
NOTE 3	DISCRETE OUTPUT IS RATED AT 200MA @ 24 VOLTS MAXIMUM SINK CURRENT	

Detailed SkyRouter Connections Z4550

Figure 6 shows the connections available on a Z4550 Series SkyRouter that can be used to interconnect with I/O modules.

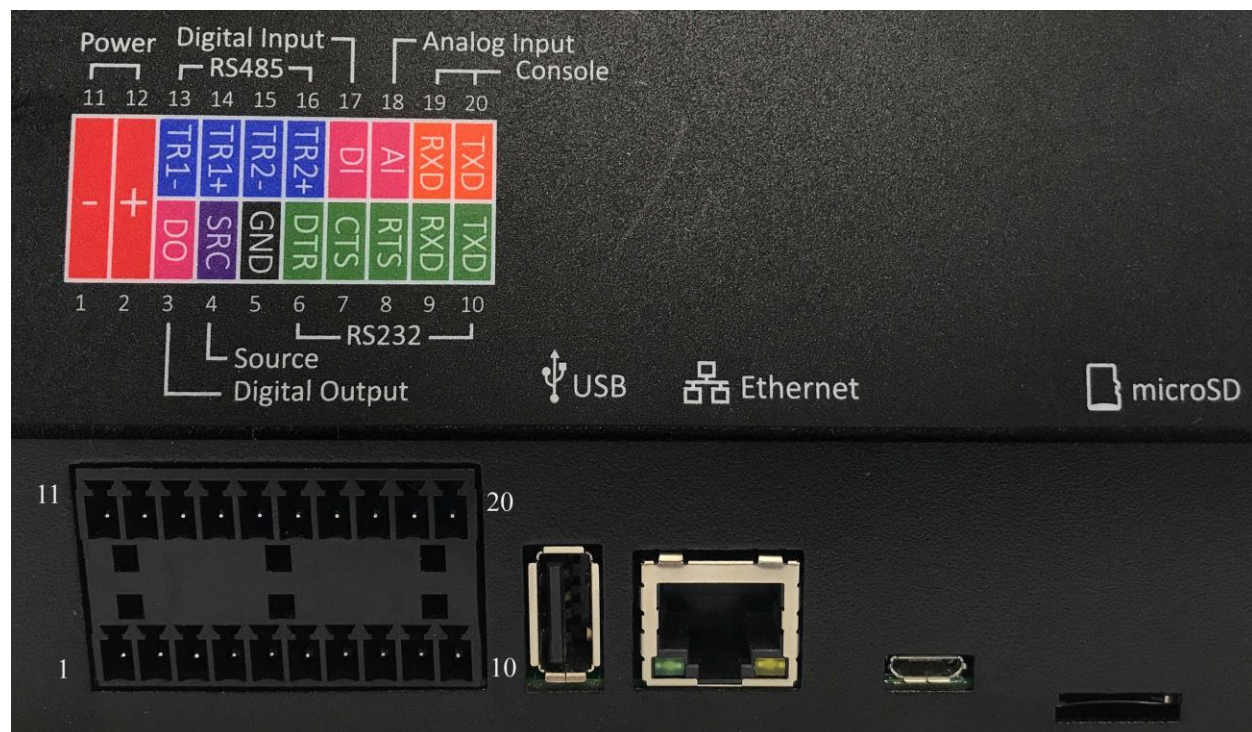


Figure 6 - Z4550 Connections

PIN 1	POWER SUPPLY GROUND	POWER SUPPLY GROUND
PIN 2	POWER SUPPLY +12VDC	POWER SUPPLY +12VDC
PIN 3	DO	DISCRETE OUTPUT ³
PIN 4	SRC	DISCRETE INPUT SOURCE
PIN 5	GND	DISCRETE OUTPUT GROUND
PIN 6	DTR	RS-232 SERIAL PORT
PIN 7	CTS	RS-232 SERIAL PORT
PIN 8	RTS	RS-232 SERIAL PORT
PIN 9	RXD	RS-232 SERIAL PORT
PIN 10	TXD	RS-232 SERIAL PORT
PIN 11	POWER SUPPLY GROUND	POWER SUPPLY GROUND
PIN 12	POWER SUPPLY +12VDC	POWER SUPPLY +12VDC
PIN 13	TR1-	RS-485 SERIAL PORT
PIN 14	TR1+	RS-485 SERIAL PORT
PIN 15	TR2-	RS-485 SERIAL PORT
PIN 16	TR2+	RS-485 SERIAL PORT
PIN 17	DIN	DISCRETE INPUT
PIN 18	AI	ANALOG INPUT
PIN 19	RXD	CONSOLE
PIN 20	TXD	CONSOLE
NOTE 1	CONNECT A 120 OHM RESISTOR ACROSS PINS 2 --> 4 FOR MULTI-DROP CONFIGURATIONS	
NOTE 2	AVAILABLE AS A THIRD WIRE GROUND FOR USE IN NOISY ENVIRONMENTS	
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