

7/11/2011

PARTECH

EVERSERV SURE CHECK TMD LIX



Behavioral Description v1.14 | Scott Leapman

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Document Revision Log

Version	Date	Description
1.00	06/29/2011	Initial Draft.
1.10	07/08/2011	Expanded scope of document to include overall UX for the TMD. Renamed to a "UX" document.
1.11	07/09/2011	Updated the RFID temperature measurement workflows per team review.
1.12	07/11/2011	Reverted the TurboTag RFID workflow.
1.13	07/11/2011	Added the Charging UX workflow.
1.14	07/11/2011	Added the Bluetooth Radio UX workflow.

Abstract

This document describes the overall user experience (UX) design of the Temperature Measurement Device (TMD). Included are workflows for measuring temperatures with the TMD when used in conjunction with a PDA running the EverServ Sure Check PDA software. Workflows are listed for capturing temperatures with the TMD in each of its three (3) measurement modes. Examples are provided with functional descriptions. Not all screens are illustrated or described in this document; however, the visual design may be applied across the entire product.

Note that all screenshots are provided as examples and are not intended to be used as the exact UI to emulate in the real product as-is.

The Visual Design Guide document describes the overall design of the product whereas this document delves deeper into each section of the applicable UI and how it should function for the user. The companion Behavioral Description document for the Configuration UI and PDA UI describes similarly the function and design of the web-based configuration interface that works in tandem with the PDA interface.

Overall Design Methodology

Where applicable, the following governing principles are used in the design of the UI:

1. The visual design of this application UI must be consistent with other applications in the EverServ suite; EverServ Enterprise Configuration Management, EverServ QSR & TSR Editions, EverServ Operations Manager, etc.
2. Optimization for the majority of defined workflows.
3. All UI controls are intended for finger access and should not require the use of a stylus.
4. Color, size, shape and position are used to group controls with similar functions.
5. Attention is guided to the primary controls in any given UI by virtue of that control's placement, color or size.
6. Visual simplicity and use of whitespace to minimize UI clutter.
7. Eliminate left/right scrolling and minimize up/down scrolling.

Navigation

The following sections outline the rationale, and where applicable, functional details, for each section of the user interface (UI) of the TMD.

All of the following screens presume that the PDA has been loaded with the appropriate checklists for the location where it is registered per the companion Server (configuration) UI.





It is unknown as to what audio feedback, if any, is available on the TMD. If possible, audio feedback should be defined for events such as but not limited to; measurement scan started, stable reading available, unstable or manual reading available, error, measurement validation is not OK and measurement validation is OK.

TMD Screen



The screen consists of the follow UI elements as LCD segments that are lit according to conditions outlined in the sections that follow:






Element	Description/Use
SCAN	Indicates that a temperature measurement is in-progress.
↓ 塔 (p)	Indicates the temperature sensing mode; probe, IR or RFID.
165.5 °F °C	Indicates the current or final temperature and the units.
MAX HOLD RANGE	Labels for the two range values.
888.8 888.8	Indicates the range of values for the measured temperature.

	Indicates the status of the Bluetooth connection to the PDA.
	Indicates that the timer mode is set and running.
	Indicates the charge level of the built-in battery.
	HACCP LED Indicators for Cold (green), Alert (red) and Hot (green).

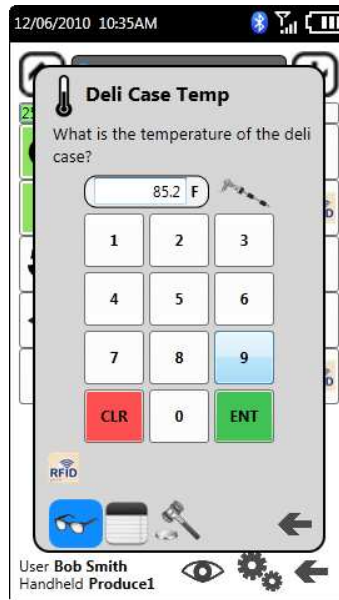
TMD Buttons



The physical buttons on the TMD control its operation and interact with a connected PDA over the Bluetooth connection as outlined in the sections that follow:

Element	Description/Use
	Initiates a measurement using the selected sensing mode. Increments the counter when in Timer mode.
	Changes the display units (F vs C). Sends an "ENT" command via BT. Decrements the counter when in Timer mode. Note: Should be relabeled as "OK/Units"
	Changes the sensing mode between probe, IR and RFID. Turns the TMD on or off. Note: Should be relabeled as "Mode/Power"
	Switches to Timer mode. Starts or stops the timer.
	Turns the Bluetooth radio on or off and enters Pairing mode.

Sure Check PDA Temperature Observation Dialog



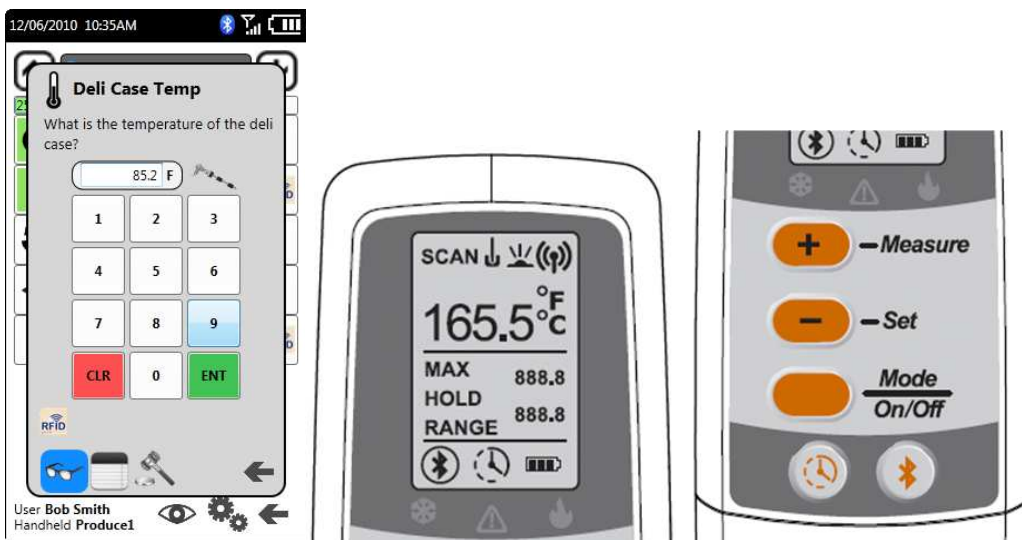
The above is a sample Observation Dialog from the prototype Sure Check PDA software for a temperature-type measurement check item. Certain screen elements are used in conjunction with the TMD when sensing a temperature for a check observation as outlined in the following sections:

Element	Description/Use
	Displays the current temperature measurement as either typed or transmitted from the TMD via BT.
	Indicates that a TMD is paired and available for use.
	Number pad used to manually enter values (if enabled).
	Button used to clear the value in the temperature display.
	Button used to accept the value in the temperature display and validate it against the check violation rules. Note that the TMD “Set” button performs the same function as described in the following sections.

Temperature Measurement Workflow

During the use of the Sure Check PDA software, a user may be required to observe a temperature-type measurement check. The sections that follow describe the interaction between the User, the Sure Check PDA software and the TMD device.

Temperature Measurement Workflow Overview



A sample Observation Dialog is shown above. This dialog expects the user to provide a temperature value for a checklist item. The user would either type in a value (manual entry) or would use a TMD to measure and supply the value to the PDA via a Bluetooth (BT) connection.

When using the RFID sensing mode, the PDA software may also be on the list of checks screen (Checklist contents) and the RFID workflow may be used as a shortcut without first having the check's respective Observation Dialog open.

To use the TMD to measure the temperature, the user would select the desired measurement mode with the Mode button and then start a measurement scan with the Measure button. Once measured, the current temperature will update on both the TMD screen and the PDA's Observation Dialog.

Regardless of the method used to supply the value to the Observation Dialog, the value will not be processed for violation until it has been validated by the user. The user may either press the ENT button on the PDA screen or press the Set/Units button on the TMD to do so. Once either condition has occurred, the value is validated against the rules set in the Configuration UI.

If the value is acceptable, the Observation Dialog is dismissed, the HACCP “OK” icons on the TMD are illuminated, and the Sure Check PDA software continues as outlined in its BD document. If the value is in violation, a Corrective Action Dialog is shown on the PDA screen and the HACCP “Alert” icon on the TMD is illuminated.

Measuring Temperatures with the Probe

For this workflow, the user will measure the temperature of an item with the built-in temperature probe in the TMD. The PDA must be displaying the respective check item's Observation Dialog.



Measurement

1. With the TMD on, press the **Mode On/Off** button until the **↓** icon illuminates to indicate the Temperature Probe sensing mode.
2. The upper value display and lower value displays should be clear (no value).
3. Press the **+ -Measure** button to start a measurement session. If any HACCP icons were illuminated from a prior measurement session, they are cleared.
4. A measurement session is started and **SCAN** flashes.
5. The current measurement value is shown in the top-most display **165.5 °C**.
6. The maximum and minimum values for all measurements thus far in this session are displayed in the range display **888.8 / 888.8** and the **RANGE** label is also illuminated.
7. Measurement samples continue (return to step 4 above) until one of the following conditions occurs:
 - a. *Stable*: 5 consecutive measurements are within 0.5F of each other.
 - b. *Aborted*: User terminates measurement by pressing **+ -Measure** before a stable temperature is measured or the session times out.
 - c. *Timed-Out*: The session times out after 30 seconds of measurements without a stable temperature.


Once a measurement session has ended, the following occurs depending on how the session ended:

Stable

This measurement session ends as soon as the measurement is considered stable. Ex: if temperatures are sampled at a rate of 1 per second and the temperature is stable, this measurement session will automatically end after 5 seconds (5 samples).

- The **SCAN** label is turned off.
- The stable measurement value is shown in the top-most display **165.5^{°F}** and is sent to the PDA for display in the Observation Dialog.
- The maximum and minimum values for the entire session are displayed **888.8^{°F}** along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label is displayed to indicate a stable measurement.

Aborted

This measurement session ends as soon as the user presses the  button; regardless of the temperature value.

- The **SCAN** label is turned off.
- The most recent measurement value is shown in the top-most display **165.5^{°F}** and is sent to the PDA for display in the Observation Dialog.
- The maximum and minimum values for the entire session are displayed **888.8^{°F}** along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label flashes to indicate that the measurement wasn't stable.



Timed-Out




This measurement session ends after the maximum session time has elapsed; regardless of the temperature value. This is a safe-guard to prevent against the TMD remaining in a sensing mode indefinitely and thus draining the battery.

- The **SCAN** label is turned off.
- The most recent measurement value is shown in the top-most display **165.5^{°F}** and is sent to the PDA for display in the Observation Dialog.
- The maximum and minimum values for the entire session are displayed **888.8^{°F}** along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label flashes to indicate that the measurement wasn't stable.

Validation

Regardless of the means by which the scanning session ended, the value will not be processed for violation by the PDA until it has been validated by the user. The user may

either press the  button on the PDA screen or press the  button on the TMD to do so. Once either condition has occurred, the value is validated against the rules set in the Configuration UI.

- *Not a Violation:* If the value is acceptable, the Observation Dialog is dismissed and the Sure Check PDA software continues as outlined in its BD document. Both the Cold  and Hot  icons on the TMD are illuminated.
- *Violation:* If the value is in violation, a Corrective Action Dialog is shown on the PDA screen and the Alert icon  on the TMD is illuminated.

Notes:


- The TMD will transmit all values as if they were typed on a Bluetooth keyboard. Therefore, the PDA must properly accept and process the values transmitted by the TMD.
- The rules for determining a stable measurement are used as an example and are configurable.
- The maximum duration of a scanning session is used as an example and is configurable.
- The sampling rate of measurements is used as an example and is configurable.
- It is suggested that algorithms be devised to prevent the TMD from inadvertently and automatically stabilizing on ambient (room) temperature before the probe is inserted in the item to be measured.

Measuring Temperatures with the IR Sensor

For this workflow, the user will measure the temperature of an item with the built-in IR sensor in the TMD. The PDA must be displaying the respective check item's Observation Dialog.



Measurement

1. With the TMD on, press the **Mode On/Off** button until the  icon illuminates to indicate the IR sensing mode.
2. The upper value display and lower value displays should be clear (no value).
3. Press the **+ - Measure** button to start a measurement session. If any HACCP icons were illuminated from a prior measurement session, they are cleared.
4. A measurement session is started and **SCAN** flashes.
5. The IR targeting LED illuminates on the front of the TMD to assist in aiming.
6. The current measurement value is shown in the top-most display **165.5 °F**.
7. The maximum and minimum values for all measurements thus far in this session are displayed in the range display **888.8 / 888.8** and the **RANGE** label is also illuminated.
8. Measurement samples continue (return to step 4 above) until one of the following conditions occurs:
 - a. *Stable*: 5 consecutive measurements are within 0.5F of each other.
 - b. *Aborted*: User terminates measurement by pressing **+ - Measure** before a stable temperature is measured or the session times out.
 - c. *Timed-Out*: The session times out after 30 seconds of measurements without a stable temperature.


Once a measurement session has ended, the following occurs depending on how the session ended:

Stable

This measurement session ends as soon as the measurement is considered stable. Ex: if temperatures are sampled at a rate of 1 per second and the temperature is stable, this measurement session will automatically end after 5 seconds (5 samples).

- The **SCAN** label is turned off.
- The IR targeting LED on the front of the TMD turns off.
- The stable measurement value is shown in the top-most display **165.5^{°F}** and is sent to the PDA for display in the Observation Dialog.
- The maximum and minimum values for the entire session are displayed **888.8^{°F}** along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label is displayed to indicate a stable measurement.

Aborted


This measurement session ends as soon as the user presses the  button; regardless of the temperature value.

- The **SCAN** label is turned off.
- The IR targeting LED on the front of the TMD turns off.
- The most recent measurement value is shown in the top-most display **165.5^{°F}** and is sent to the PDA for display in the Observation Dialog.
- The maximum and minimum values for the entire session are displayed **888.8^{°F}** along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label flashes to indicate that the measurement wasn't stable.



Timed-Out




This measurement session ends after the maximum session time has elapsed; regardless of the temperature value. This is a safe-guard to prevent against the TMD remaining in a sensing mode indefinitely and thus draining the battery.

- The **SCAN** label is turned off.
- The IR targeting LED on the front of the TMD turns off.
- The most recent measurement value is shown in the top-most display **165.5^{°F}** and is sent to the PDA for display in the Observation Dialog.

- The maximum and minimum values for the entire session are displayed  along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label flashes to indicate that the measurement wasn't stable.

Validation

Regardless of the means by which the scanning session ended, the value will not be processed for violation by the PDA until it has been validated by the user. The user may either press the  button on the PDA screen or press the  button on the TMD to do so. Once either condition has occurred, the value is validated against the rules set in the Configuration UI.

- *Not a Violation:* If the value is acceptable, the Observation Dialog is dismissed and the Sure Check PDA software continues as outlined in its BD document. Both the Cold  and Hot  icons on the TMD are illuminated.
- *Violation:* If the value is in violation, a Corrective Action Dialog is shown on the PDA screen and the Alert icon  on the TMD is illuminated.

Notes:

- The TMD will transmit all values as if they were typed on a Bluetooth keyboard. Therefore, the PDA must properly accept and process the values transmitted by the TMD.
- The rules for determining a stable measurement are used as an example and are configurable.
- The maximum duration of a scanning session is used as an example and is configurable.
- The sampling rate of measurements is used as an example and is configurable.
- It is suggested that algorithms be devised to prevent the TMD from inadvertently and automatically stabilizing on ambient (room) temperature before the IR sensor is properly aimed at the item to be measured.

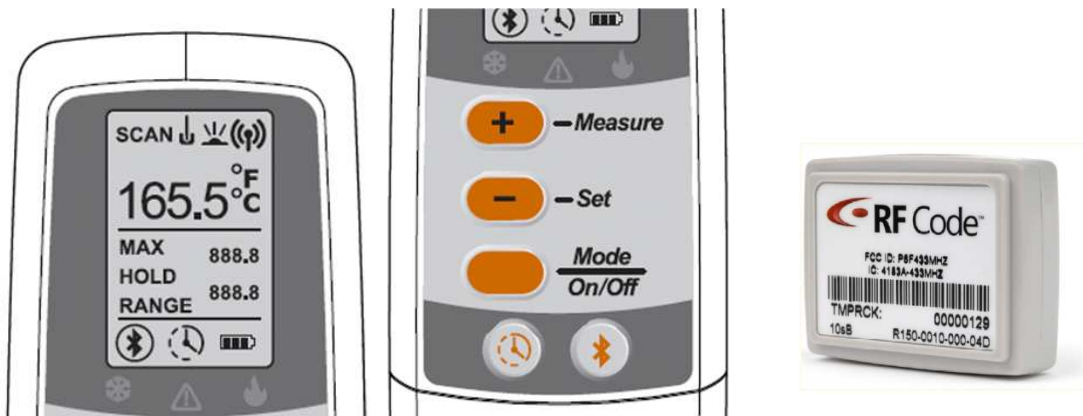
Measuring Temperatures with the RFID Sensor

For this workflow, the user will measure the temperature of an item with the built-in RFID scanner in the TMD. The PDA may be displaying the respective check item's Observation Dialog or it may be displaying the list of check items (Checklist contents) screen. For full details, see the "RFID Tag Workflow" section in the "EverServ Sure Check v2 PDA Behavioral Description" document.

There are several varieties of RFID temperature tags available and the workflow varies for each.



Temperature RFID Tag

This type of RFID temperature tag senses the current temperature but does not store historical data. When requested by the TMD, this tag will send the current temperature value as a single data point as well as the tag's unique ID. This tag is not parsed for a "stable" reading – only the most current reading as of the scanning session is used.



Measurement

1. With the TMD on, press the  button until the  icon illuminates to indicate the RFID sensing mode.
2. The upper value display and lower value displays should be clear (no value).

3. Press the  button to start a scanning session. If any HACCP icons were illuminated from a prior measurement session, they are cleared.
4. A scanning session is started and **SCAN** flashes.
5. The TMD searches for a suitable RFID tag that has temperature sensing capability. The search continues until one of the following conditions occurs:
 - a. *Suitable Tag Found*: A temperature-sensing tag has been found (non-TurboTag).
 - b. *Aborted*: User terminates scanning for a tag by pressing  before a suitable tag has been found and before the session times out.
 - c. *Timed-Out*: The session times out after 30 seconds of searching without a suitable tag being found.


Once a scanning session has ended, the following occurs depending on how the session ended:

Suitable Tag Found

This scanning session ends as soon as a suitable RFID tag has been found.

- The **SCAN** label is turned off.
- The current measurement value is shown in the top-most display **165.5^{°C}** and is sent to the PDA for display in the Observation Dialog along with the tag's unique ID.
- The maximum and minimum value displays remain blank.
- The **HOLD** label is displayed to indicate a stable measurement.

Aborted

This scanning session ends as soon as the user presses the  button.

- The **SCAN** label is turned off.
- The top-most display **165.5^{°C}** remains blank. No data is transmitted to the PDA.
- The maximum and minimum value displays remain blank.




Timed-Out

This scanning session ends after the maximum session time has elapsed. This is a safeguard to prevent against the TMD remaining in a sensing mode indefinitely and thus draining the battery.

- The **SCAN** label is turned off.
- The top-most display **165.5^{°F}** remains blank. No data is transmitted to the PDA.
- The maximum and minimum value displays remain blank.

Validation

The PDA will compare the transmitted temperature and unique ID values against the check item per the values set in the Configuration UI.

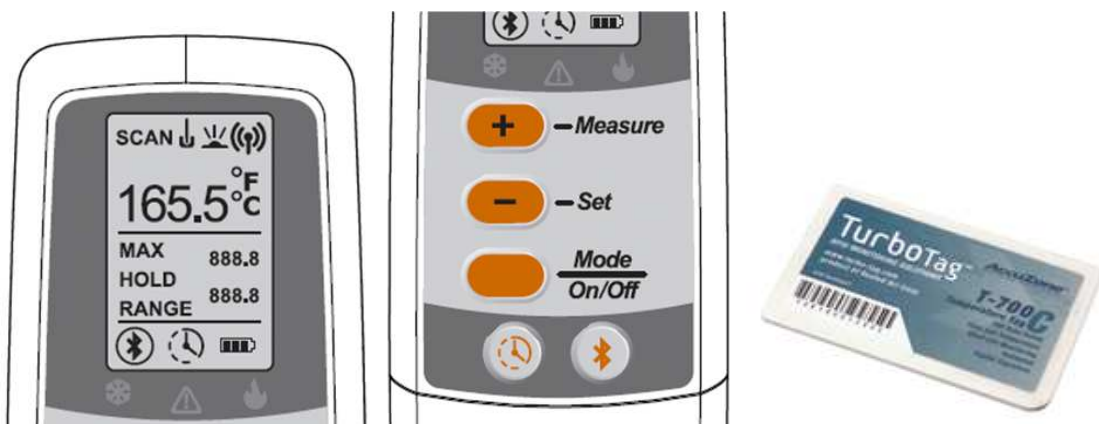
- *Not a Violation*: If the value is acceptable, the Observation Dialog is dismissed (if it was open) and the Sure Check PDA software continues as outlined in its BD document. Both the Cold  and Hot  icons on the TMD are illuminated.
- *Violation*: If the value is in violation, a Corrective Action Dialog is shown on the PDA screen and the Alert icon  on the TMD is illuminated.

Notes:


- For full details of how RFID tag sensing is used with the Sure Check PDA software, see the “RFID Tag Workflow” section in the “EverServ Sure Check v2 PDA Behavioral Description” document.
- The TMD will transmit all values as if they were typed on a Bluetooth keyboard. Therefore, the PDA must properly accept and process the values transmitted by the TMD.
- The maximum duration of a scanning session is used as an example and is configurable.

TurboTag RFID Tag

This type of RFID temperature tag senses the current temperature and stores up to 702 historical data points in built-in memory in the tag. When requested by the TMD, this tag will send all data points to the TMD including the tag's unique ID. This tag's historical data is parsed for a "stable" reading in addition to being sent to the PDA for processing.



Measurement

1. With the TMD on, press the **Mode On/Off** button until the  icon illuminates to indicate the RFID sensing mode.
2. The upper value display and lower value displays should be clear (no value).
3. Press the **+ - Measure** button to start a scanning session. If any HACCP icons were illuminated from a prior measurement session, they are cleared.
4. A scanning session is started and **SCAN** flashes.
5. The TMD searches for a suitable RFID tag that has temperature sensing capability.
6. The process continues until one of the following occurs:
 - a. *Suitable Tag Found*: All historical data is transmitted from the tag to the TMD.
 - b. *Aborted*: User terminates scanning for a TurboTag RFID tag by pressing **+ - Measure** before a suitable RFID tag is found and before the session times out.
 - c. *Timed-Out*: The session times out after 30 seconds of searching for a suitable RFID tag.



Once a scanning session has ended, the following occurs depending on how the session ended:

Suitable Tag Found

This scanning session ends as soon as a suitable RFID tag is found.

- The **SCAN** label is turned off.
- Starting with the most current temperature value, the TMD will step backwards in time through the historical data received from the tag for up to 50 data points. Each step backward will compare the prior consecutive 5 values for a stable reading.
- Once 5 consecutive measurements are within 0.5F of each other, the temperature is considered stable and that value is shown in the top-most display **165.5^{°F}** and is sent to the PDA along with the tag's unique ID and all historical data.
- The maximum and minimum values for the entire session (up to 50 data points) are displayed **888.8** along with the **RANGE** label and are sent to the PDA.
- The **HOLD** label is displayed to indicate a stable measurement.

Aborted

Scanning for a TurboTag RFID tag ends as soon as the user presses the  button. If a TurboTag was found before the user aborts the session, then the session cannot be aborted and pressing the  button will start a new RFID scanning session.

- The **SCAN** label is turned off.
- The upper value display and lower value displays should be clear (no value) since no tag was found.




Timed-Out

Scanning for a TurboTag RFID tag ends after the maximum session time has elapsed and no tag was found. This is a safe-guard to prevent against the TMD remaining in a sensing mode indefinitely and thus draining the battery.

- The **SCAN** label is turned off.
- The upper value display and lower value displays should be clear (no value) since no tag was found.

Validation

The PDA will compare the transmitted temperature and unique ID values against the check item per the values set in the Configuration UI.

- *Not a Violation*: If the value is acceptable, the Observation Dialog is dismissed (if open) and the Sure Check PDA software continues as outlined in its BD document. Both the Cold  and Hot  icons on the TMD are illuminated.
- *Violation*: If the value is in violation, a Corrective Action Dialog is shown on the PDA screen and the Alert icon  on the TMD is illuminated.

Notes:

- For full details of how RFID tag sensing is used with the Sure Check PDA software, see the “RFID Tag Workflow” section in the “EverServ Sure Check v2 PDA Behavioral Description” document.
- Once a TurboTag RFID tag has been found, the TMD will transmit the pertinent values as if they were typed on a Bluetooth keyboard. Therefore, the PDA must properly accept and process the values transmitted by the TMD.
- The maximum duration of a scanning session is used as an example and is configurable.

Timer UI Workflow

The TMD has a built-in timer that can either count up from zero (stopwatch) or count down time from a user-specified value.




If a timer (count down or count up) is in-progress, the  icon blinks. This applies to all timer and measurement modes.

When in the timer mode, the upper (large) display is not used and should remain blank. The middle display is used to count minutes from 0-999 and the lower display is used to count seconds from 00.0 to 59.9.

Ex:













1. The middle display starts at 000 and the lower display starts at 00.0
2. The lower display counts from 00.0 seconds to 59.9 seconds. Then it resets to 00.0 and the middle display increments to 1 to represent 1 minute.
3. The current time is read by combining the integer value in minutes from the middle display and the decimal value in seconds from the lower display.
 - a. Ex: 23 in the middle display and 34.3 in the lower display equals 23:34.3 or 23 minutes and 34.3 seconds.
4. Once the middle display reaches 999 minutes and the lower display reaches 59.9 seconds, the stopwatch function stops and remains at that value.

Notes:

- Either timer mode can be viewed or initiated when the TMD is not actively measuring a temperature; when **SCAN** is not displayed.
- If a timer is in-progress, a temperature measurement may be started and the timer will continue to run in the background. The blinking  icon indicates that a timer is still running in the background.
- An in-progress timer is ended when the TMD enters the Off power state but can continue to run when in all other power states. The TMD will provide an audio alert before automatically entering the Off power state and thus canceling any active timer.


















Using the Stopwatch

The stopwatch function starts at zero and counts elapsed time in minutes and seconds until the user stops the function. The stopwatch is capable of counting elapsed time up to 16 hours, 39 minutes and 59.9 seconds.

1. With the TMD on and not actively measuring a temperature, press .
2. The timer icon  is displayed and all other display elements are cleared except for the Bluetooth  and battery status  icons which remain.
 - a. If a timer is currently in-progress (count up or count down), its current value is shown while the timer icon  blinks. Continue with step 4.
 - b. If a timer is not currently in-progress, the display show their initial values as outlined above.
3. Press  to start the stopwatch.
4. The timer icon  blinks and the displays update. No units are shown.
 - a. Press  to stop the timer. The timer icon  stops blinking. If the timer has been stopped, pressing  again resumes the timer.
 - b. Hold  for 2 seconds to clear the timer, reset the displays and stop the timer icon  from blinking, if applicable.

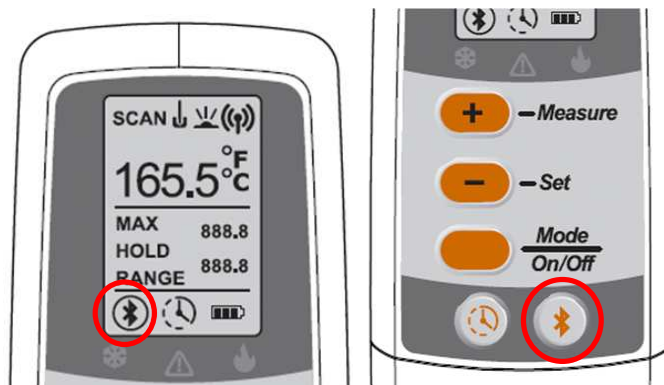
Using the Countdown Timer

The countdown timer function starts at a user-specified value and counts down to zero. When the counter reaches zero (0), the timer stops and the TMD beeps (tbd). The countdown timer is capable of being set in whole minute increments from 1-999.

1. With the TMD on and not actively measuring a temperature, press .
2. The timer icon  is displayed and all other display elements are cleared except for the Bluetooth  and battery status  icons which remain.
 - a. If a timer is currently in-progress (count up or count down), its current value is shown while the timer icon  blinks. Continue with step 5.
 - b. If a timer is not currently in-progress, the display show their initial values as outlined above.
3. Press  or  to set the middle display to the desired count down start time in minutes from 1 to 999.
 - a. If either  or  is held for more than 2 seconds, the middle display increments (or decrements) in five (5) minute increments until released.
 - b. If  is held for 2 seconds, any set time is cleared.
4. Press  to start the count down from the set value.
5. The timer icon  blinks and the displays update. No units are shown.
 - a. Press  to stop the current timer. The timer icon  stops blinking. If the timer has been stopped, pressing  again resumes the timer.
 - b. Hold  for 2 seconds to clear the timer, reset the displays and stop the timer icon  from blinking, if applicable.

Bluetooth UI Workflow

The status of the TMD's built-in Bluetooth radio can be determined by the state of the Bluetooth status icon. The Bluetooth radio's state can be controlled via the Bluetooth button.




Bluetooth Status

The Bluetooth icon indicates the radio's connectivity and power state per the following table.

Icon	State	Description
(none)	Off	BT radio is off.
Bluetooth icon	On	BT radio is on but not connected.
Bluetooth icon	Connected	BT radio is on and connected but not actively communicating.
Bluetooth icon (blinking)	Pairing	BT radio is on and not connected and is available for pairing requests.
Bluetooth icon (blinking ring)	Communicating	BT radio is on, connected and actively communicating.

Bluetooth Radio Control

The Bluetooth radio's various states can be controlled with the BT button  per the following table.

Current State	Action	Final State
Any except Off	Hold for 2 seconds	Off
Off	Hold for 2 seconds	On
Any except Pairing, Communicating	Hold for 5 seconds	Pairing
Pairing	Hold for 5 seconds	Prior state (aborts Pairing)

Notes:

- If the BT radio is already connected and the user requests the Pairing mode, the current connection is broken in favor of finding a new connection.
- The TMD will automatically exit Pairing mode if no suitable connection is made within 60 seconds. It will then revert to the prior mode and be available to reconnect to the last-paired device.
- If the TMD enters the Off power state, the state of the Bluetooth radio is retained (except for Pairing mode) and resumed once the TMD enters any other power state.


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
Battery UI

The status of the TMD's built-in rechargeable battery can be determined by the state of the battery status icon. The battery can be charged by either a Micro USB cable or a drop-in charger. Either method follows the same workflow outlined below.




Battery Status





Regardless of the operational mode and for all power states except for "Off," the battery status icon  will reflect the real-time estimated power level per the following table.

Battery Icon	State	Power Level
	High	70-100%
	Medium	40-69%
	Low	10-39%
 (outline blinking)	Critical	<10%

The TMD will automatically enter the "Off" power state approximately 5 minutes after reaching the Critical battery state. At that time, any current operation is aborted.

Battery Charging

The TMD will start charging the battery when it is connected to a suitable power source; either the drop-in charger or a Micro USB cable. During the charging process, the battery icon  will indicate the current charge level as outlined in the following table. For all of the following states, the outline of the battery icon is solid.

Battery Icon	State	Power Level
 (all 3 internal segments solid)	Full	100%
 (all 3 internal segments blinking)	High	70-99%
 (2 internal segments blinking)	Medium	40-69%
 (1 internal segment blinking)	Low	1-39%

Notes:

- If the TMD is in the “Off” state when connected to a suitable power source, the unit will immediately enter the “Sleep” power state for the duration of the charging process. The battery will charge and the icon will indicate the charging state, but the device will otherwise remain in the “Sleep” power state.
- Once charging is complete, the device will remain in its current power state until disconnected from a power source or another suitable trigger changes the power state.
- A “Full” battery will trickle charge to maintain that power level until the power source is disconnected.
- Disconnecting the TMD from a power source will immediately set the TMD to the “Active” power state regardless of the battery level or the prior power state.

Power States



The TMD has many components that consume battery power. In order to conserve the built-in rechargeable battery, power states have been defined as per the following table.

State	Description
Active	TMD is actively being used; a measurement scan is in-process, a button has been pressed, etc.
Idle	TMD is not actively being used but is in a state such that it can be used immediately upon request. BT may be connected but data is not being transmitted or received.
Sleep	TMD is able to accept connections via BT or USB but otherwise is not being used. BT radio is on but not connected.
Off	TMD is using the minimal amount of power and must be activated via the power button in order to be used.

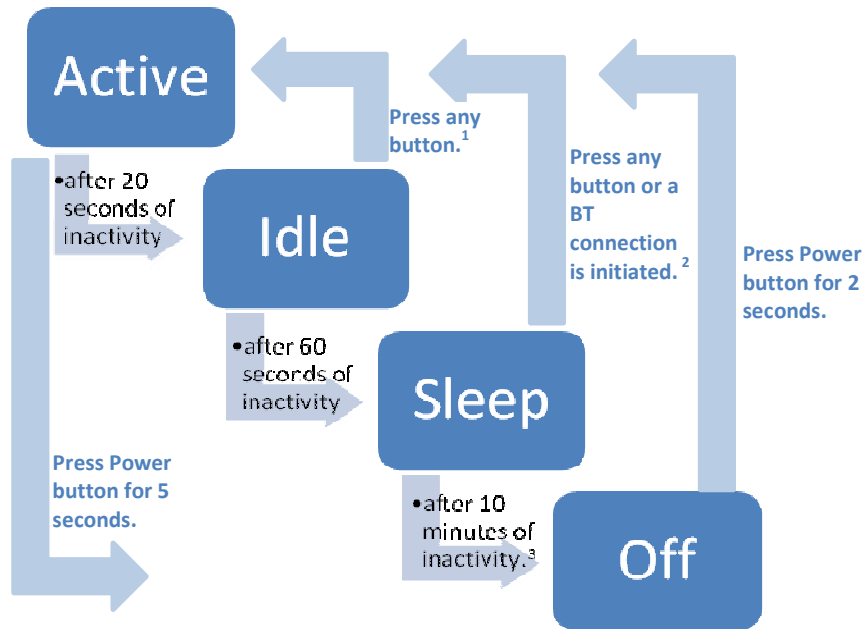
The chart below outlines the various major subsystems of the TMD and whether they are on and consuming power for each of the above defined power states.

Component	States:			
	Active	Idle	Sleep	Off
Backlight	Yes			
Temperature Probe	Yes ¹	Yes ¹		
IR Sensor	Yes ¹	Yes ¹		
RFID Sensor	Yes ¹	Yes ¹		
LCD Screen	Yes	Yes	Yes ²	
Bluetooth Radio	Yes	Yes	Yes	
USB Port	Yes	Yes	Yes	
MCU	Yes	Yes	Yes	Yes ³

Notes:

1. Only the last-selected sensor is on in this state. All other sensors are off regardless of state.
2. Backlight is off and only the Bluetooth icon  and the battery icon  are visible.
3. MCU is in a low-power state (standby) only to enable the Power On/Off button.

The chart below illustrates the cadence and timing of power states and how the user's interaction with the TMD affects the entry and exit of each state.



Notes:

1. Button press returns the TMD to "Active" and initiates the function respective to the button pressed.
2. Button press returns the TMD to "Active" but does not initiate the function respective to the button pressed. The button must be pressed again after the TMD returns to the "Active" state.
3. Fifteen (15) seconds before automatically transitioning from the Sleep to Off states, the device will emit a sound (tbd).

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.