STEVAL-IPE020V1: ST energy meter application
based on the Android platform

Introduction

The ST energy meter application is a user friendly Android™ based solution based on NFC technology that can write and read data to and from a dual EEPROM. The application was developed on Android 2.3.4 which is compatible with 2.3.4 and higher versions. NFC is a wireless technology based on RFID (radio frequency identification) that establishes a communication between the devices by bringing them into close proximity.

The M24LR64-R is a dual interface EEPROM which targets a wide range of applications, such as, industrial/medical equipment and consumer electronics. RFID (13.56 MHz) and I2C serial communication are the two interfaces available with EEPROM. The M24LR64-R supports ISO 15693, NFC-V category of NFC communication.

The single-phase energy meter based on an STPM metering IC and the STM8L152C6 microcontroller is a fully functional single-phase solution with parameter display, tamper management, maximum demand (MD) calculation, and with dual interface (RF and I2C interface) EEPROM data logging and low power management.

Figure 1.   M24LR64 EEPROM based energy meter

AM15268v1

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1 Application overview

1.1 Installation and launch of application

The user can easily download the ST energy meter application from the Google Play store by browsing the following link in 'Cell Phones': https://play.google.com/store?hl=en&tab=w8

The user can search for the application by the name 'ST energy meter application' and an application with the name 'Metering' and ST logo appears on the screen with an 'Install' button option. Select the Install button to download the application to your phone.

The ST energy meter application is an .apk file that can be installed on an Android based cell phone by browsing the application using any file browser. After successful installation of the .apk file, an application with 'EnergyMeterApplication' appears in the applications list. Select the application to launch it, as shown in *Figure 2*.

Figure 2. Launch energy meter application
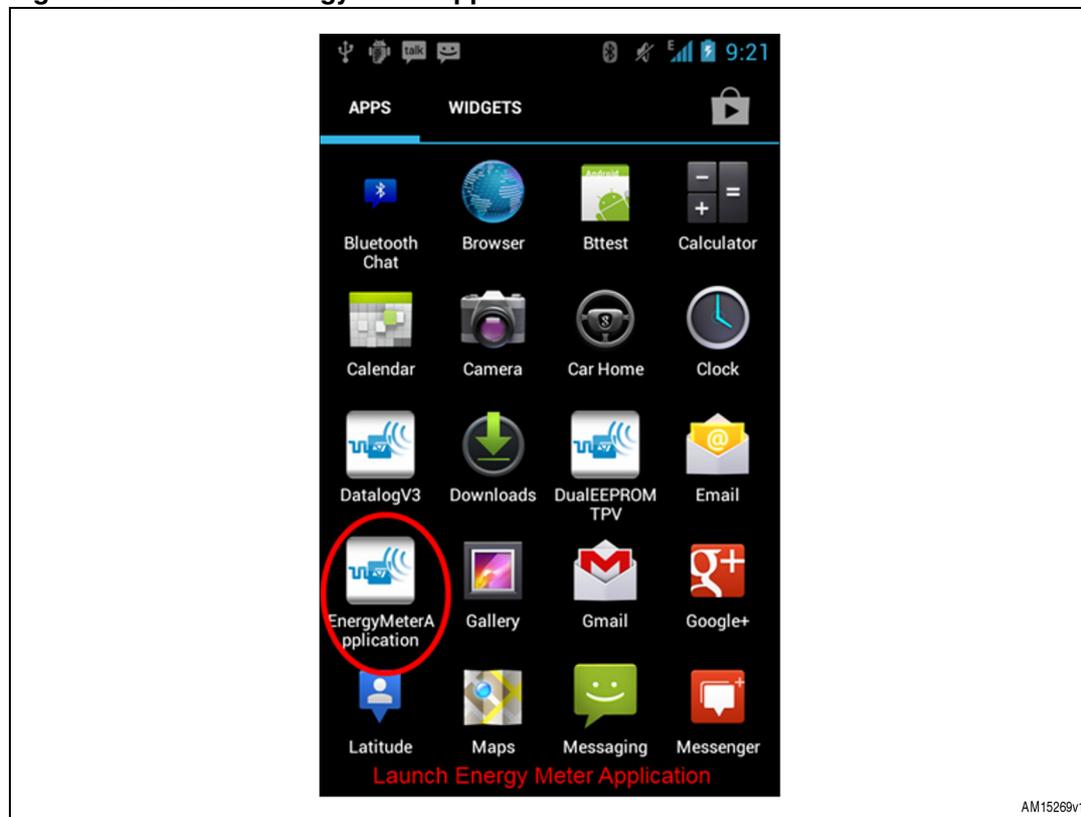
On launching the application, the user is able to see the main screen with four buttons, as follows (*Figure 3*):

   a) Application
   b) Slideshow
   c) Help
   d) www.st.com/dualeeprom.

Figure 3.   Main application

Application

Select the 'Application' button to perform read and write operations with the dual EEPROM through NFC.

Help

Select the 'Help' button to go to the help file integrated into the application.

Slideshow

Selecting this option from the menu opens a slideshow on the concept and benefits of the dual EEPROM.

Clicking on 'www.st.com/dualeeprom' leads the user to the dual EEPROM webpage.

Note: The images in this document are the same as those found in the Help menu of the application. Kindly refer to the comments in RED on each screen for help.

1.2 NFC detection

Figure 4. NFC discovery
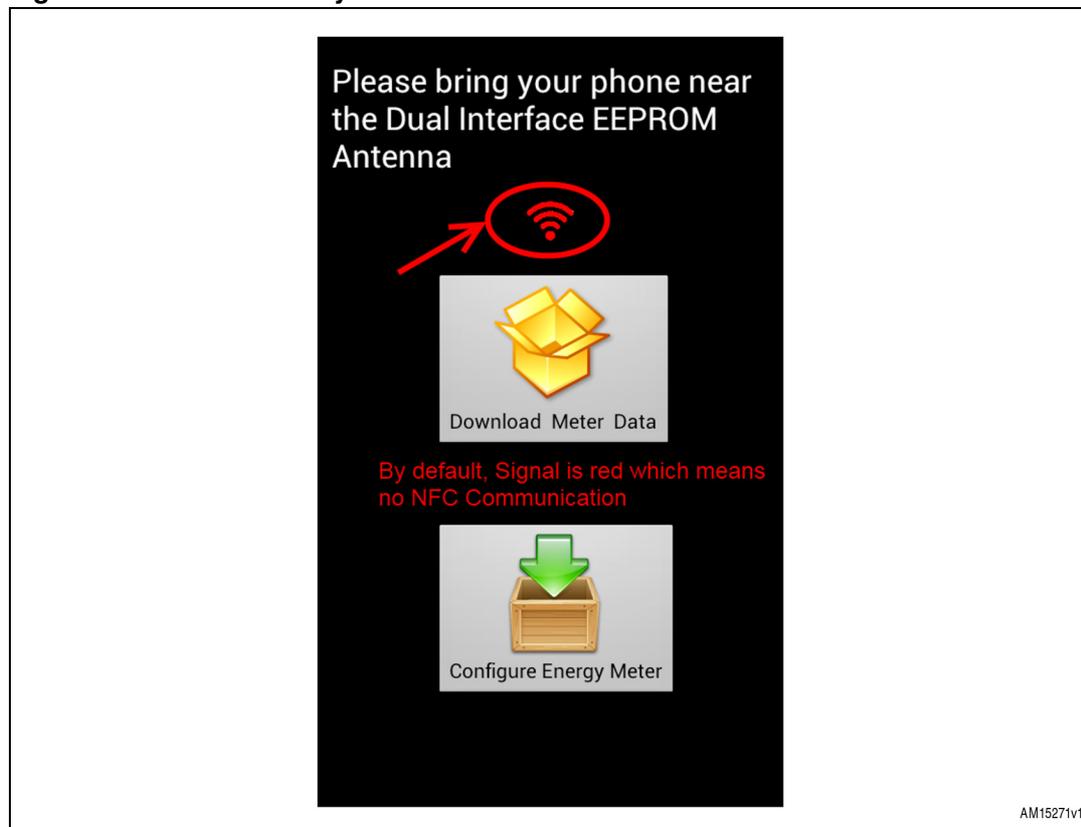
When the user selects the Application button on the main screen of the application, it switches to the screen shown in *Figure 4*. The red signal indicates that no NFC tag was detected by the application. The user needs to bring the phone into the NFC range.

The user must also make sure that their phone has support for NFC; this can be verified in the 'Specifications' list of the phone or the Go to Settings Menu > Wireless & Networks Menu on their phone, where they can see if NFC is on the list. If their phone does not support NFC, the user is able to install the application but it does not work.

If the Tag is detected by the application; the signal turns to green, as indicated in *Figure 5*. The application is now ready to download data from the dual EEPROM.

Figure 5.   Successful discovery of NFC
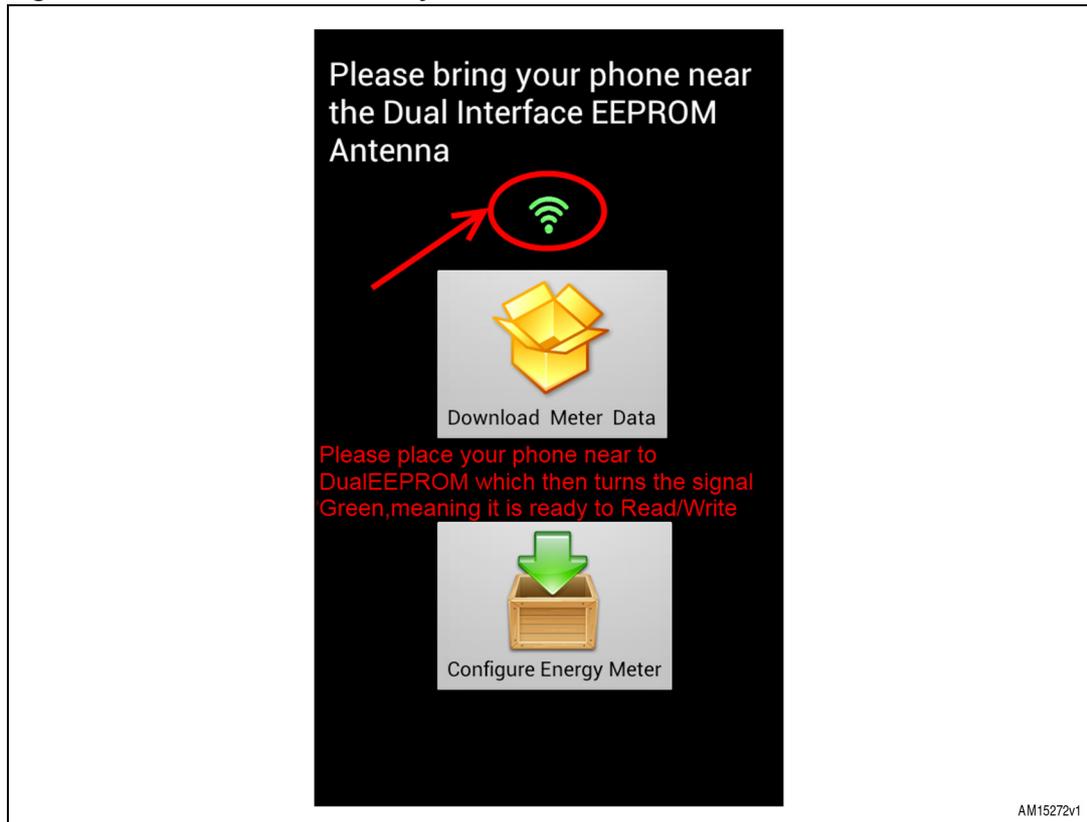
1.3   Configure energy meter

Once the NFC tag is successfully discovered by the application, the user can easily perform read and write operations with the dual EEPROM. The 'configure energy meter' is a very useful feature of the application. Using this feature, the user can enter the manufacturer name, model, serial number, hardware version, firmware version and manufacturer location and can select the 'setup energy meter' button to write the data into the dual EEPROM which can be retrieved anytime. Before writing any data, the user should make sure that the color of the signal is GREEN, as indicated in *Figure 8*. If at anytime the signal turns to red, it means the cell phone has been removed from the NFC range. It returns to green once the mobile is in the NFC range. This is useful for the user during 1st time installation of the meter. Configuration of the meter may not be needed once the meter is already installed.

**Figure 6.   Configure energy meter (no NFC tag detected)**

These entries for the configuration of the meter can be done in offline mode and can then be programmed into the dual EEPROM once the phone is brought into range. The signal color changes from red to green.

Warning: Using the 'Configure' option for an already installed E-meter erases the old data and adds the new data.

Figure 7.   Configure energy meter (NFC tag detected)
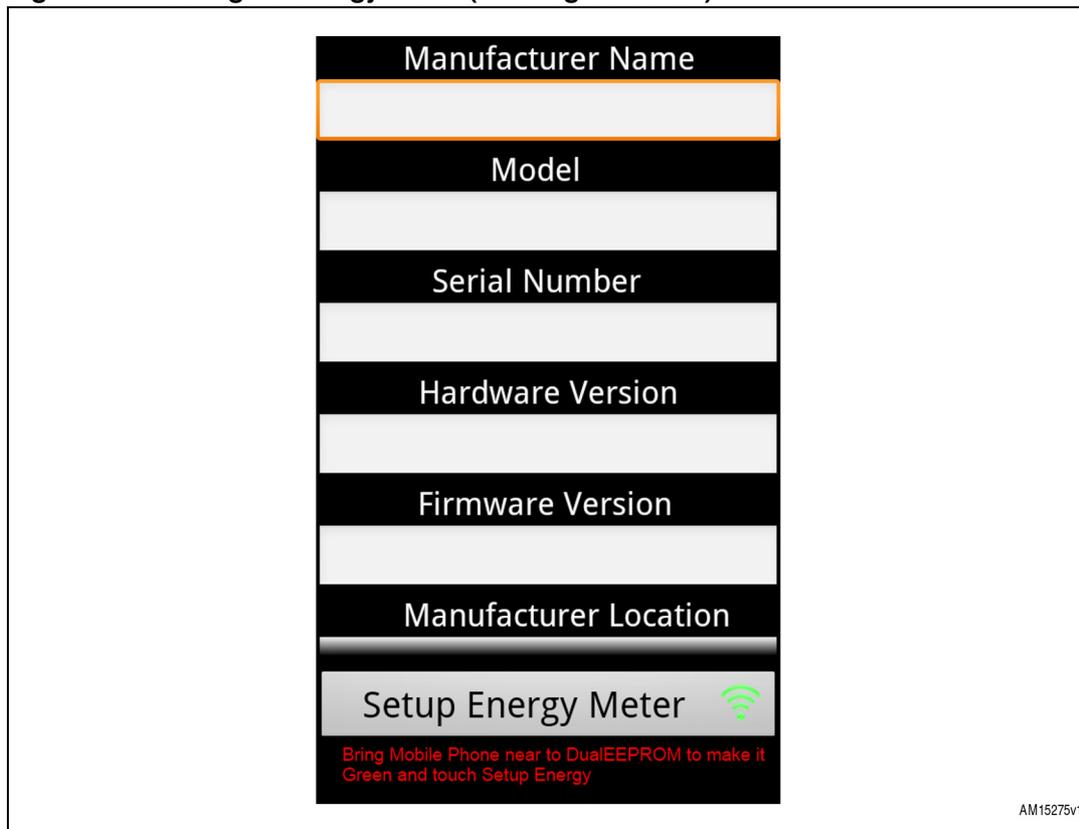
1.4   Download meter data

Select the 'download meter data' button to read the full memory of the dual EEPROM. When the user selects this button, it starts retrieving data and a progress bar starts moving. It stops once the data is read successfully. Before downloading any data from the memory, the user must check that the color of the signal is green, which means that the NFC tag is in range of the cell phone and has been discovered by the application.

Figure 8. **Downloading meter data**
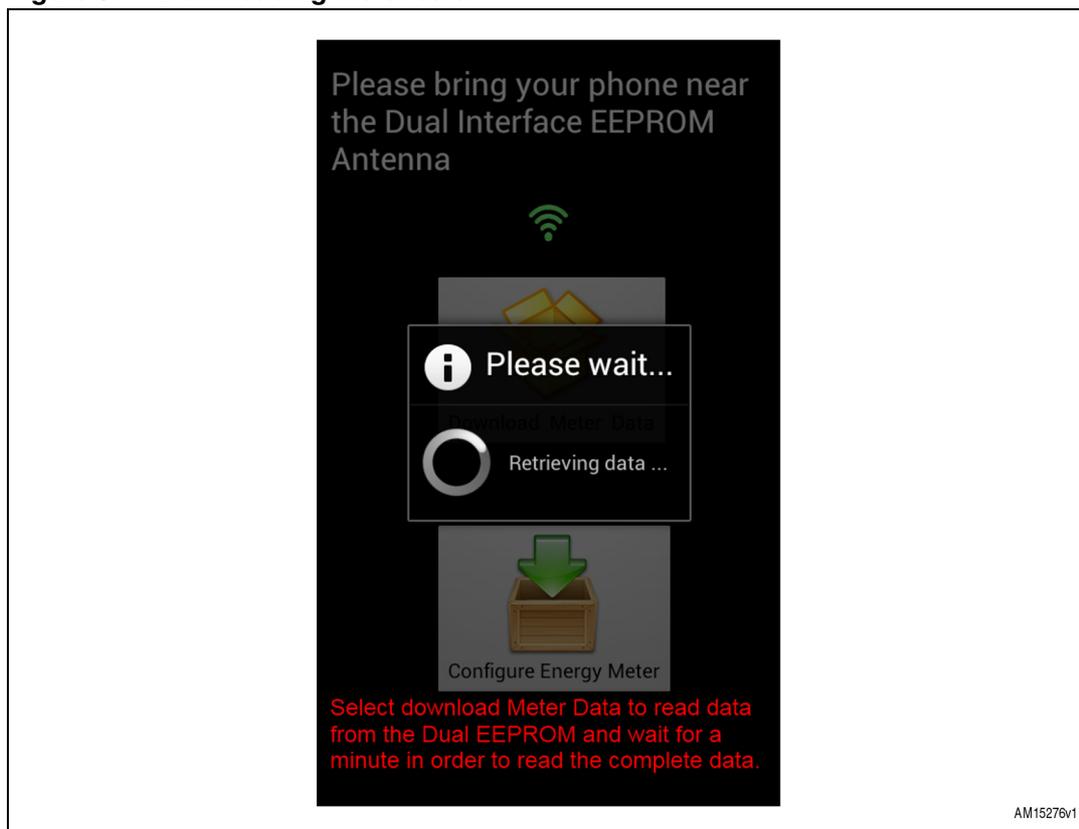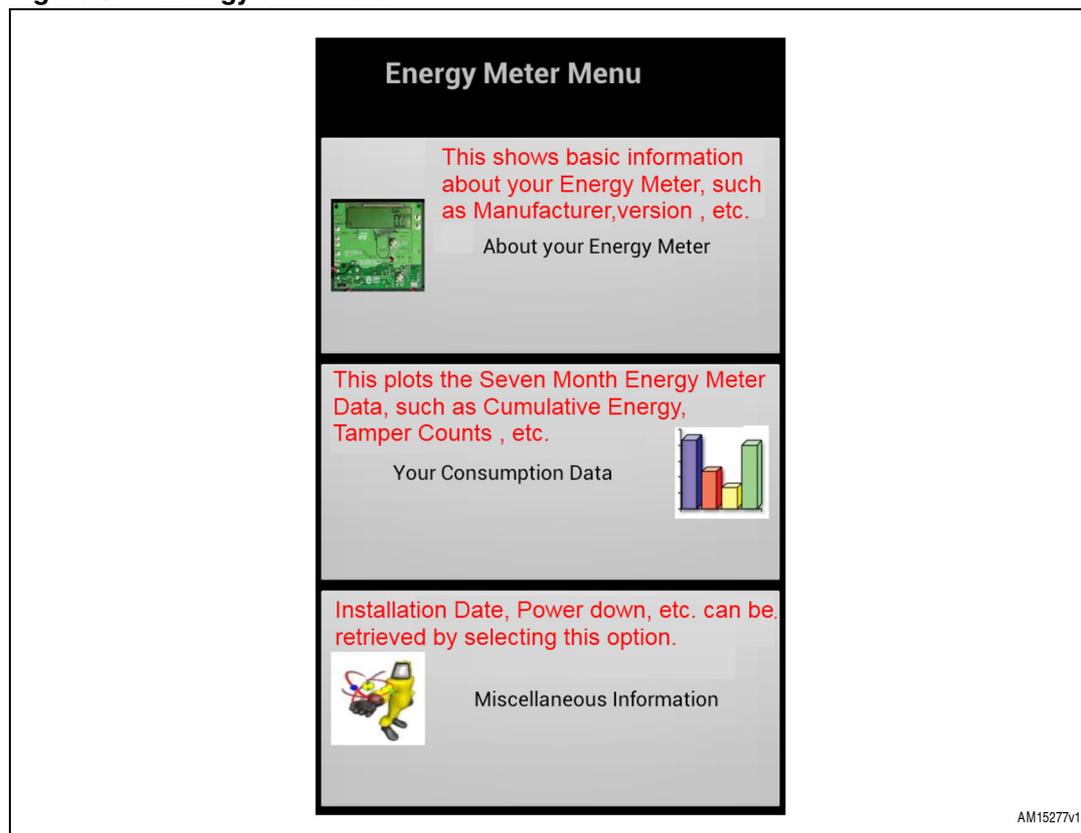
Figure 9.   Energy data menu


After the data is successfully downloaded, the user can view that data in three categories:

    a)   About energy meter

    b)   Consumption data

    c)   Miscellaneous Information.

1.5   About energy meter

The 'About energy meter' category provides the details of the energy meter as entered by the user using the 'configure energy meter' option of the application.

Figure 10. About energy meter
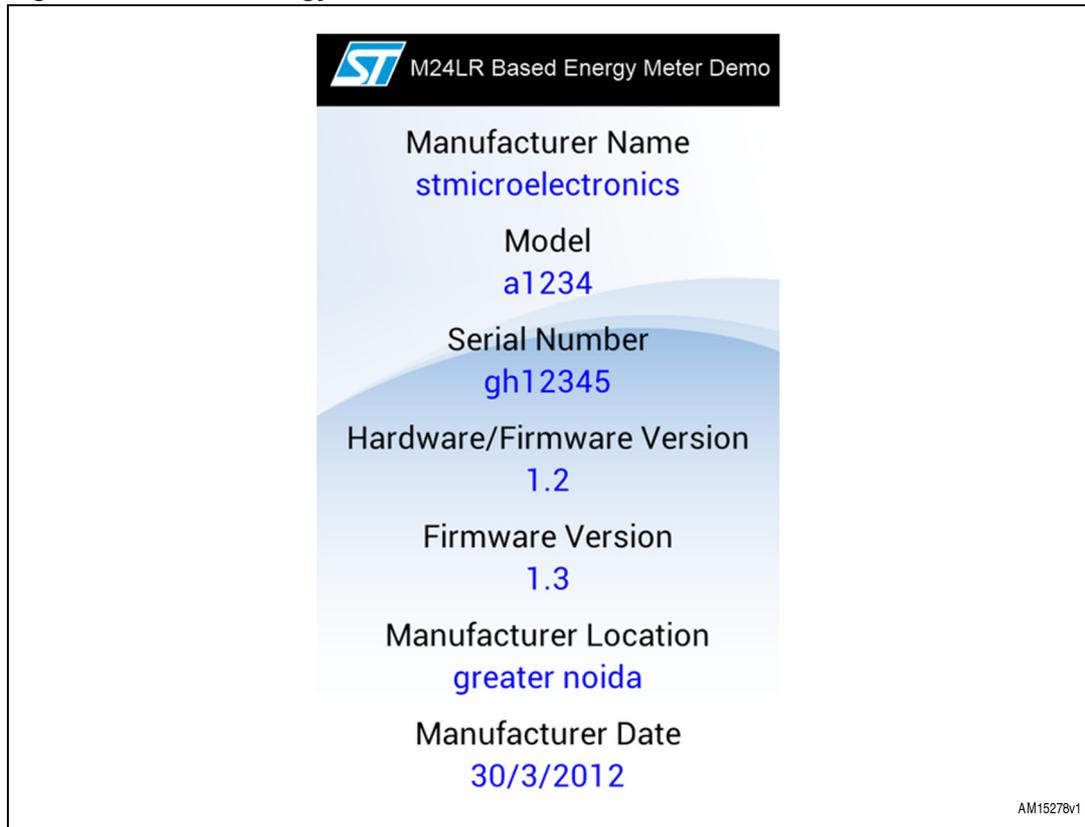
1.6 Consumption data

In this category, select any of the options, such as cumulative energy, maximum demand log, cumulative energy month, average PF log, earth tamper count, reverse tamper count, neutral missing count or case tamper count to plot its corresponding data for the last 7 months. To view and compare data for the last 7 months is a very important feature of the application.
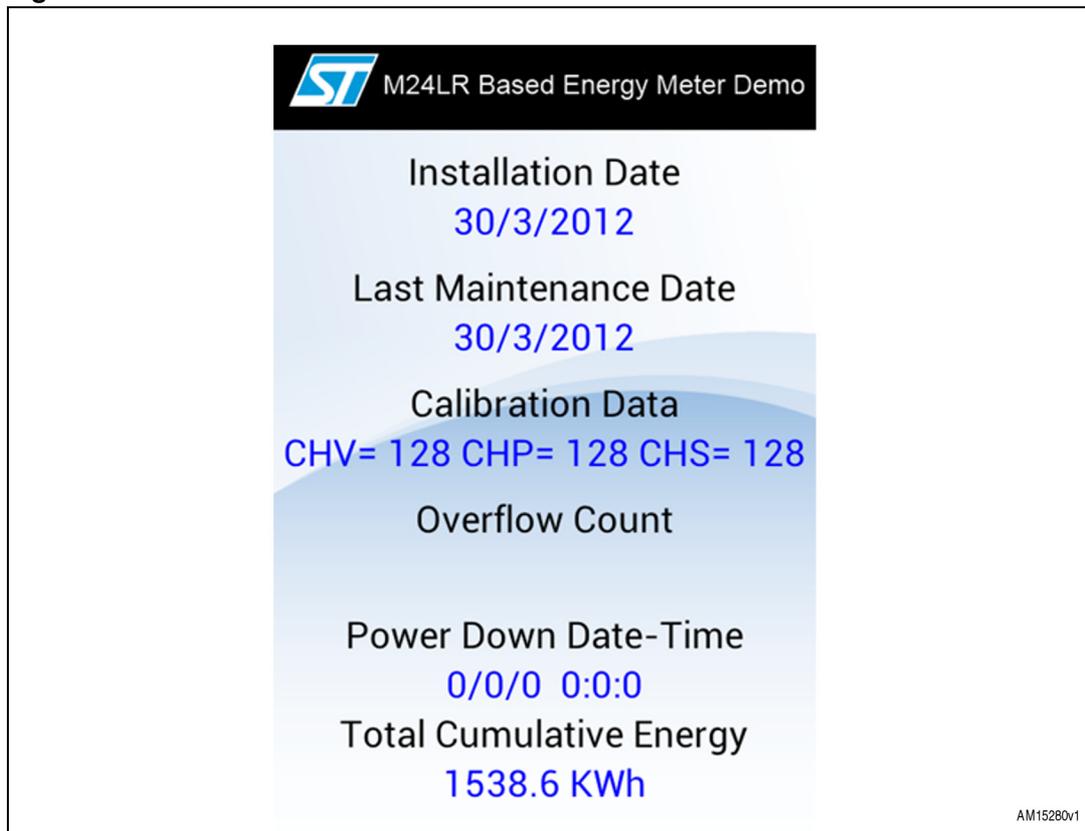
Figure 11.   Consumption data
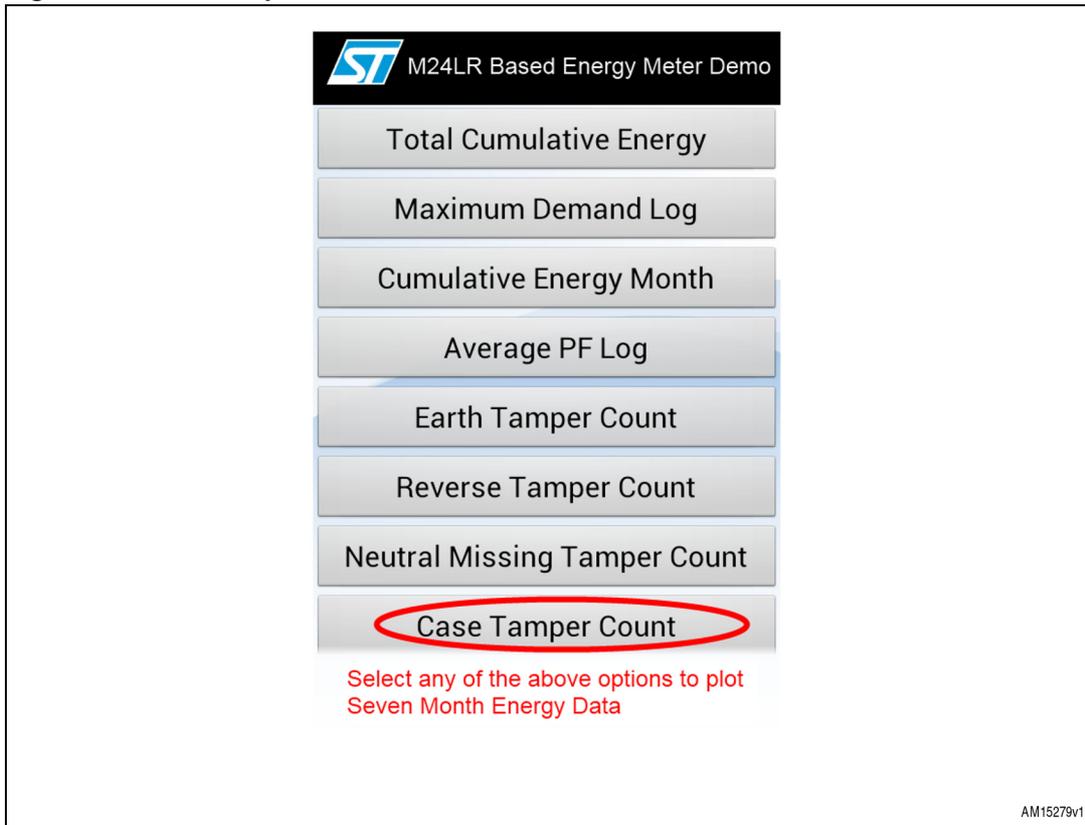
1.7   Miscellaneous information

Miscellaneous information is the last category of data downloaded from the dual EEPROM. It provides the basic energy meter data such as the installation date, last maintenance date, calibration data, and power-down date-time, total cumulative energy, and overflow count in the form of text. Miscellaneous information is not configurable and is directly read from the dual EEPROM.

Figure 12. Miscellaneous information

1.8 Plotting consumption data

Figure 12 and *13* are snapshots of the plots used to display 7-month energy meter data. These plots are provided with zoom and pan effects to make them easier to use.

Figure 13.   Cumulative energy plot
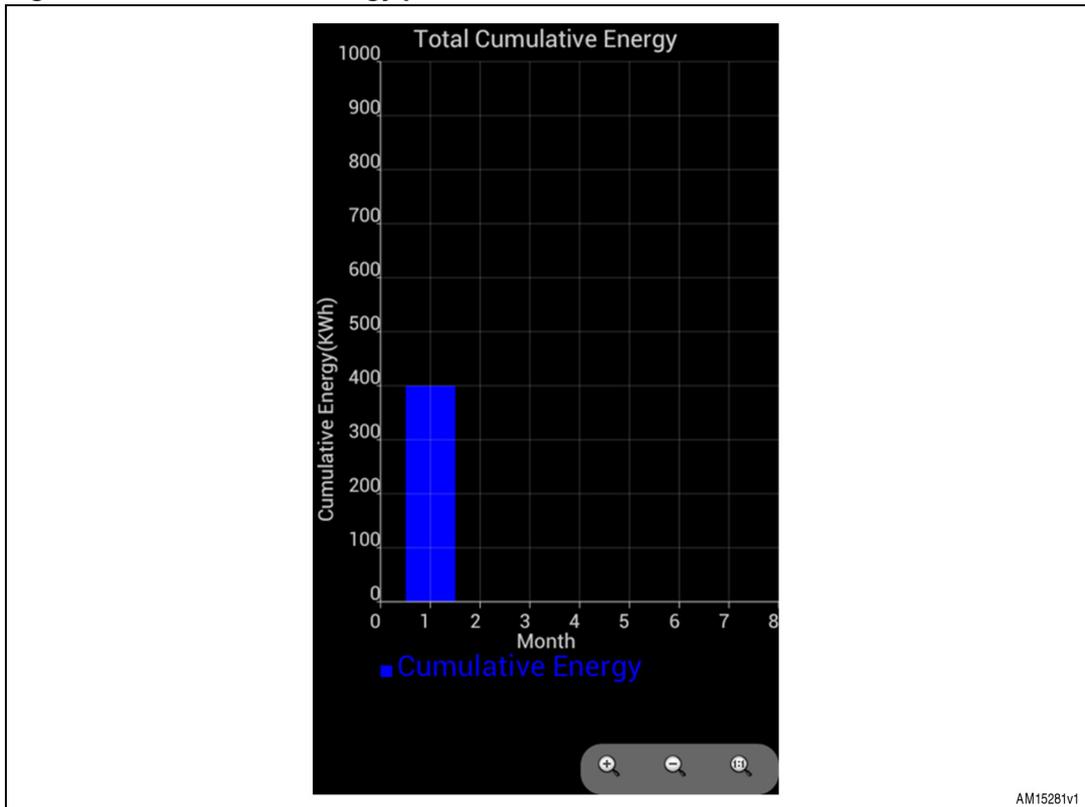
Figure 14. Earth Tamper count plot
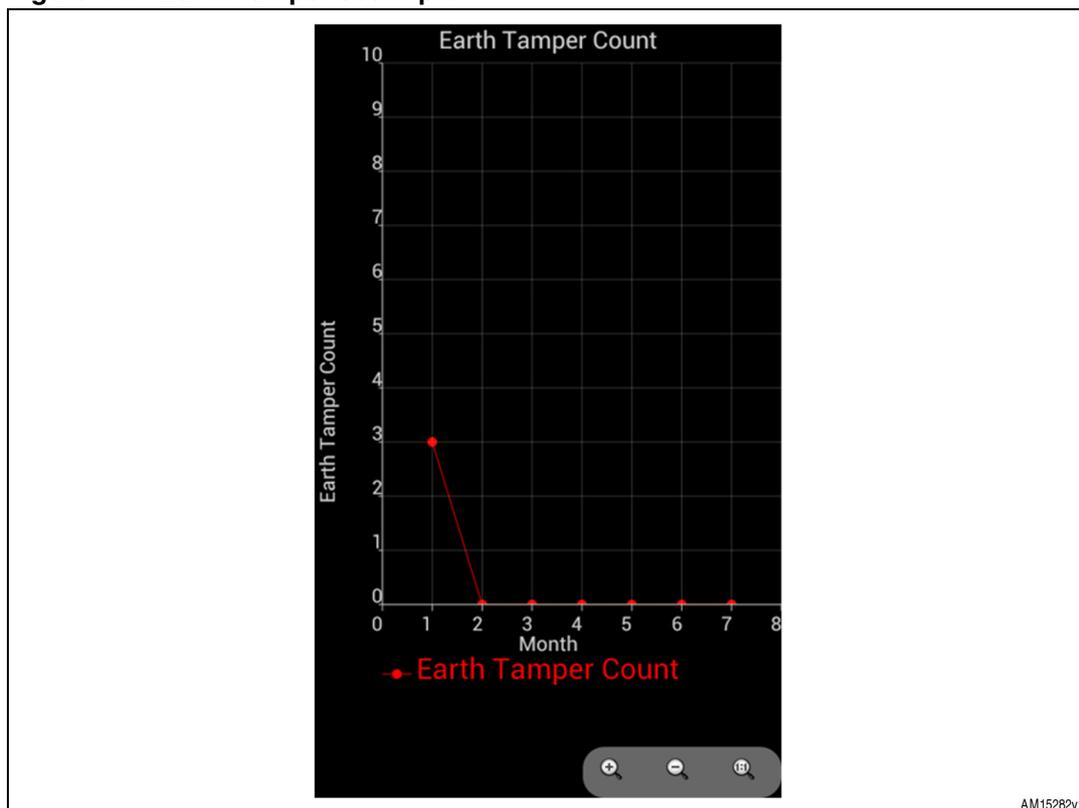
Appendix A   Definitions

Table 1.   **Definitions**

Acronym	Definition
NFC	Near field communication
RFID	Radio frequency identification
EEPROM	Electrically erasable programmable read only memory

Revision history

Table 2. **Document revision history**

Date	Revision	Changes
29-Nov-2012	1	Initial release.

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