CANKey Datasheet
CAN USB Adaptor

General Description

CANKey is a compact CAN USB adaptor designed for CAN bus communication used in networks with a large number of nodes that require communication over large distances. Applications such as building and industrial automation require reliable and robust communication as well the ability to operate without extra infrastructure such as repeaters and hubs.

CAN communication offers excellent reliability and flexibility without costly requirements found in Ethernet based deployments. Lightweight protocols that operate over CAN are excellent for sensor data networks that require high reliability and communicate infrequent small data packets.

The CANKey unit designed by SMT is capable of transmission rates as low as 10 kBit/s allowing communication distances up to 1000 meters over CAT5 cable. At this communication rate, branches with no terminations are possible making the CAN network topology for building and industrial applications simplistic and reliable.

Applications

- Building Automation Systems
- Industrial Control Data Networks
- Automotive Systems
- HVAC Controls

Features

- USB 2.0 Compliant
- USB HID Compliant for easy configuration on various platforms
- CAN bus connects to RJ45 port allowing usage of CAT5 cabling for long distance communication and usage of standard networking crimp/termination hardware as compared to RS232 type interfaces
- RJ45 port supports two CAN bus branches
- Port for external power injection. Voltage drop due to long cable routes and large number of devices often requires the bus to be powered by a higher voltage.
- Switch to allow the bus to be powered by USB power or external injected power. Useful for small networks or for configuring a single device.
- High input impedance supports up to 256 nodes
- ISO 11898 compatible
- Short circuit protection on all outputs
- Supports transmission rates from 10 kBits/s to 125 kBits/s
- Communication distance up to 1000 meters (depending on topology and baud rate)
- Terminations are not required and branches are permitted at lower baud rates
- LEDs on Tx, Rx and USB buffer size help with troubleshooting and diagnosing faulty/damaged cabling issues.

Functional Specifications

Electrical Characteristics	
Operating Voltage	5V DC (USB Power)
Current Consumption	100 mA
Max CAN Injection Voltage	Max: 24 VDC[1] Typical: 12 VDC
Overvoltage Line Fault Protection	±60V
ESD Protection	IEC-1000-4-2 Level 4 ±15kV Air Gap Test ±8kV Contact Mode Test
CAN	
Max Nodes	Supports up to 256 nodes
Baud Rate	10kBits/s to 125kBits/s
Cable Distance	
Star Topology	500m[1]
Bus Topology	1000m[1]

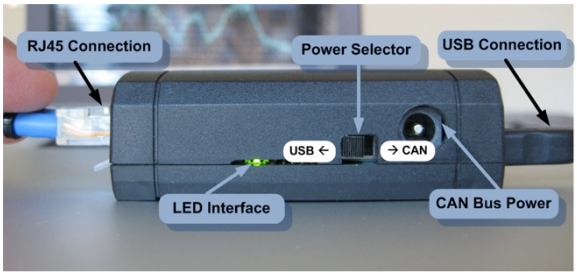
[1] Dependent on number of nodes and current consumption per node.

Environmental	
Operating Temperature	-0° to 40°C / 32° to 104°F
Storage Temperature	-25° to 70°C / -13° to 158°F
Storage Humidity	5% to 90% RH non-condensing

Physical	
Dimensions	76mm x 32.3mm x 25.4mm 3” x 1.27” x 1”

Approvals/Compatibility	
CAN	11898 Compatible
USB	2.0
Safety Requirements	12V SELV Separated Extra Low Voltage. See power supply for cULus and/or CSA rating.

CanKey Operation



USB power can be used for networks or devices that require less than 400mA in total. For larger networks, power the CAN bus with an appropriate DC supply rated for your network.

Toggle the selector switch towards USB to use USB power and towards the power connector to use the external power supply. The CanKey is powered by USB power so the unit will function regardless of the switch state.

Plug the CAN bus into the RJ45 connection according to Figure 1. Interface the CANKey to your device using a mini USB cable connection. See Figure 3 for LED functionality and troubleshooting.

CanKey Wiring

Recommended cable types:

- Outdoor environments:
  Hyperline Cable: UTP2-C5E-SOLID-OUTDOOR-40-500
- Indoor applications: Standard CAT5E cable

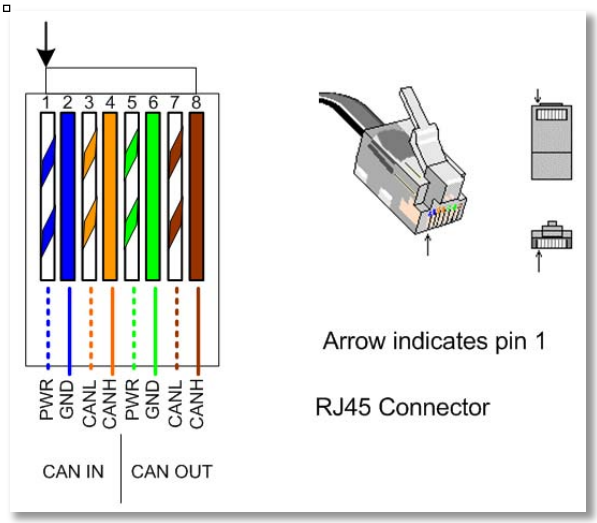


Figure 1. RJ45 Connection to CAN Bus

Network Topologies

The following topologies can be used when using a CAN bus network:

Star: Each node is connected together in one common place. This connection does not require a hub or any smart routing device. The bus locations simply need to be electrically connected.

Bus: Nodes are connected in series with each other forming a continuous bus with incoming and outgoing CAN ports. Wiring of the dataloggers is shown in Figure 1.

Wireless: Hybrid CAN/Wireless nodes can serve as a coordinator to connect other wireless nodes.

Combination: A combination of star, bus and wireless networks can be combined as shown in Figure 2.

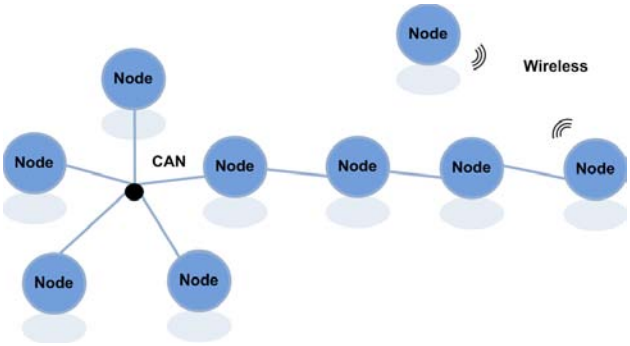


Figure 2. CAN Bus Network Topologies

Typically, 120Ω termination resistors are not required. However, if lengths are long and CAN communication errors are observed the end of the line may need to be terminated.

Interface

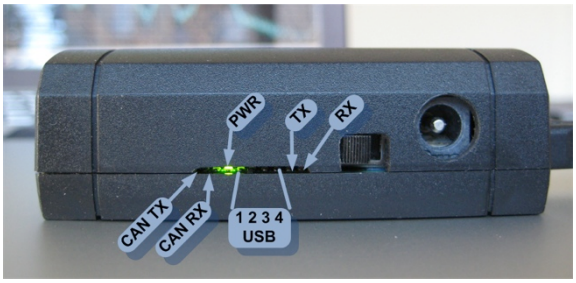


Figure 3. LED Functionality

Upon receiving USB power the PWR LED will illumination. TX and RX are lit upon CAN controller communication and CAN TX and CAN RX are displayed when communication occurs on the physical CAN bus. The USB LEDs labeled 1,2,3,4 represents a bar graph showing the activity of the internal USB buffer.

Network Isolation

Wiring between units and to electrical power supplies is a potential entry point for noise that could adversely affect sensitive measurements. In certain cases, the CAN network must be isolated or filtered to prevent noise and/or ground loops and from affecting datalogger measurements.

To achieve power isolation, use an isolation power transformer. Another grounding point of the CAN bus may occur through the USB port and through the computer used to monitor the network. Ensure the computer is also plugged into the isolation transformer.

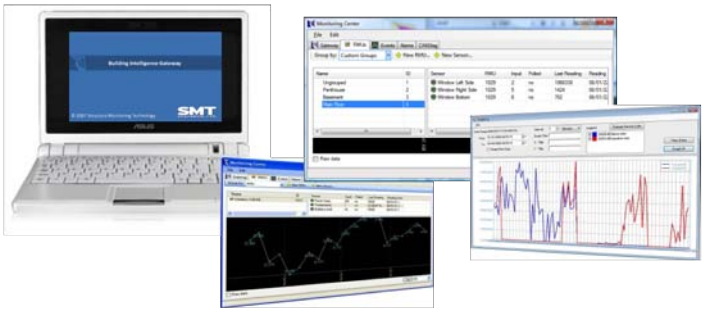
Noise on CAN power and ground can be filtered by placing capacitors from both CAN power and CAN ground tied to building/earth ground. The size and voltage of capacitors is to be determined by the amount of AC noise recorded on the CAN network.

Troubleshooting	
Datalogger measurement inconsistent	See Network Isolation Notes. Add AC filtering capacitors between power and ground of the CAN bus at datalogger locations.
Low Voltage at dataloggers	Increase the voltage of power supply. Resistance in the wires may cause a voltage drop once the datalogger draws power during data acquisition and communication sequences.
Dataloggers do not transmit messages	Add 120Ω termination resistors at end node locations between CANL and CANH.

Ordering Information	
CANKey	CANKey-001
CANKey with 120Ωresistor	CANKey-001-120ohm
12VDC Power Supply	CANKey- PWR-12VDC

Specifications are subject to change without notice

Usage with SMT Building Intelligence Gateway



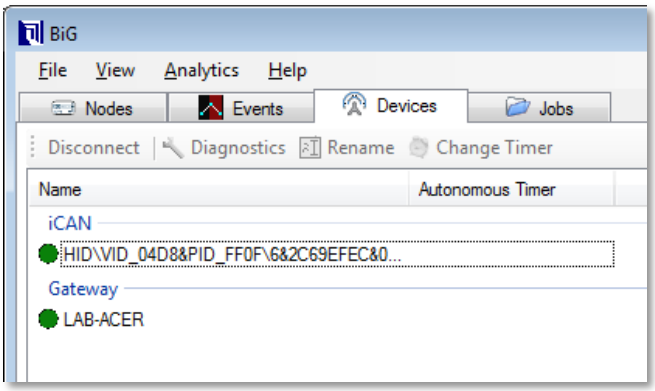
Connect the CANKey to the Building Intelligence Gateway (BiG) computer USB port.

WARNING

The RJ45 port is **NOT** an Ethernet port, it is the CAN Port Interface. Plugging the RJ45 port into a PC may damage the CANKey and/or the PC.

After connecting to BiG, Windows will install the appropriate drivers. You may need to remove and re-insert the CANKey and/or restart Windows.

Select the *Devices* tab in BiG. The HID should appear under the iCAN device. This name can be renamed by right clicking on the device name and selecting *Rename*.

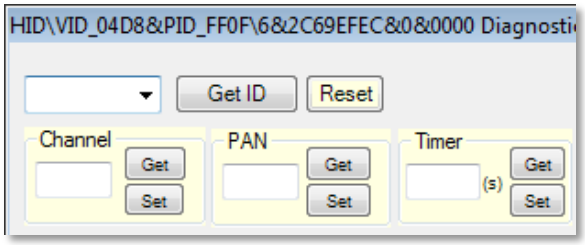


Connect the CANKey to the CAN bus by connecting the CAN RJ45 connector to the WiDAQ network according to the wiring diagram as shown in Figure 1.

If there are more than two WiDAQs on the network, slide the power selector switch towards the power port and energize the CAN network with a suitable power supply. All WiDAQs will perform measurements and transmit data upon power up. Very large networks may result in problems with in-rush current, you may need to segment the network and energize the network one segment at a time.

WiDAQ Access via CAN Bus

To query WiDAQ settings over the CAN Bus, double click on the CANKey description under *Devices*.



Select GetID to perform a GetID broadcast to all WiDAQs on the network. WiDAQ serial numbers will populate in the drop down box. If the WiDAQ ID did not populate, select GetID again as some IDs may not appear if there is excessive traffic on the CAN bus or if the WiDAQ was busy. Alternatively, you can manually enter the ID you wish to communicate with.

If a WiDAQ is set to fast sampling it may be necessary to force it into diagnostics mode. This is possible by pressing the WiDAQ button 5 times. Both LEDs will illuminate after this action.

Once the ID is shown in the ID Box you may query other settings such as wireless settings and data logger configuration settings. Consult the WiDAQ datasheets for further information.

WiDAQ sample rates are configured by changing the Timer setting. Each WiDAQ must be configured individually. Simply enter the value and select Set.