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Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





A Wireless Mesh IoT sensor system

Vicotee Njord series Nodes

FEATURES

A SmartMesh IP network consists of a highly scalable self-forming multi-hop mesh of wireless nodes, known as motes, which collect and relay data, and a network manager that monitors and manages network performance and security, and exchanges data with a host application.

- > 99.999% Data Reliability even in harsh, dynamically changing RF environments
- Secured Network
- Makes traditional sensors wireless
- Covers most standard sensor interfaces
- Low Power – Runs on batteries for years
- Delivers real-time critical information
- Network Manager supports up to 100 nodes
- Mesh Network Node distances typical 50m
- WEB browser based Interface configuration

DESCRIPTION

Vicotee Njord Nodes, are Sensor and Sensor interface Units in a wireless mesh network system.

The complete Network system also consists of a Wireless Gateway, and other system units (illustrated in Application example below).

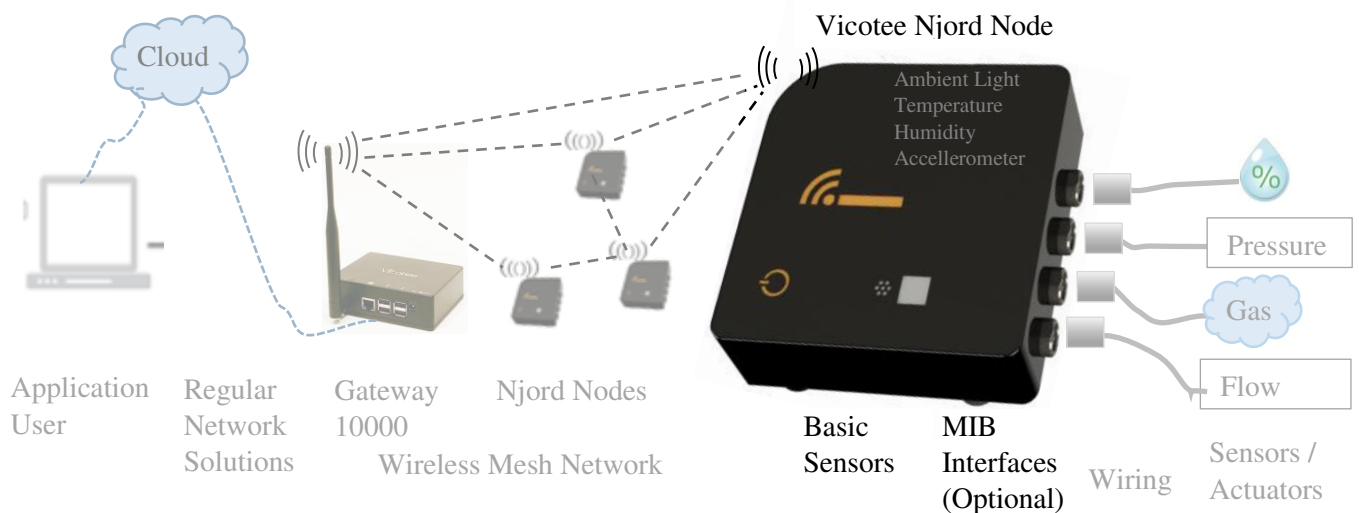
Mesh Network in Vicotee Njord Nodes is based on the SmartMesh IP Dust network from Linear Technology.

Njord Nodes exists in several different models, all with basic sensors for: Temperature, Ambient Light, Humidity and Acceleration, both static and dynamic.

Different models are equipped with optional MIB (Module Interface Board) Interfaces for connection to most types of sensors.

Vicotee Njord Nodes are primary powered by embedded batteries that can last for several years, depending on connected sensors and measurement interval. Nodes with External power connection is also available.

Application Example



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1 REVISION HISTORY

Date	Revision	Description
2016-10-26	Rev. A	Initial version
2016-11-02	Rev. B	Corrected erroneous pinout on all MIB Models on Rev. A. Added Revision History table.

2 NJORD SERIES NODE MODEL

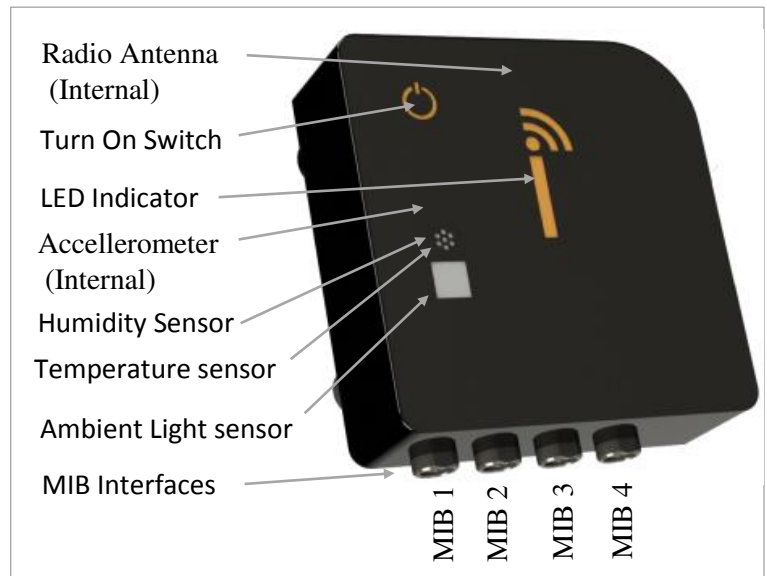
Njord Series Nodes are available in different Models shown below. Customized Models can also be available.

MIB (Module Interface Board) connectors connects External sensors/Actuators/IO/Power through MIB 1 – MIB 4.

Only used MIBs on the actual Node Model are mounted, and always in fixed location as shown.

MIB Model <No> specifies types of interfaces available in a specific MIB.

The Node model shown here has internal antenna.



Manufacturer Part No	Node Model	MIB Model	Interfaces (Basic Sensors and MIB Interfaces for Sensors)
1100837	Vicotee Njord 10000	-	Basic sensors: Temperature, Humidity, Ambient light, Accelerometer
1100839	Vicotee Njord 10031	-	Basic sensors: Temperature, Humidity, Ambient light, Accelerometer
		<1>	MIB 1: 4-20mA Dual Channel (Sourcing) <1>
		<3>	MIB 2: Isolated: PMBUS, Power In
1100841	Vicotee Njord 10008	-	Basic sensors: Temperature, Humidity, Ambient light, Accelerometer
		<8>	MIB 1: Isolated: I2C, Digital In, Power Out
1100843	Vicotee Njord 10087	-	Basic sensors: Temperature, Humidity, Ambient light, Accelerometer
		<7>	MIB 1: UART, Analog In, Power Out
		<8>	MIB 2: Isolated: I2C, Digital In, Power Out
1100845	Vicotee Njord 10381	-	Basic sensors: Temperature, Humidity, Ambient light, Accelerometer
		<1>	MIB 1: 4-20mA Dual Channel (Sourcing)
		<8>	MIB 2: Isolated: I2C, Digital In, Power Out
		<3>	MIB 3: Isolated: PMBUS, Power In
1100847	Vicotee Njord 15467	-	Basic sensors: Temperature, Humidity, Ambient light, Accelerometer
		<7>	MIB 1: UART, Analog In, Power Out
		<6>	MIB 2: SPI, Power Out
		<4>	MIB 3: I2C, Dry Switch, Power Out
		<5>	MIB 4: 1-Wire, Low Side Switch

3 BASIC SENSORS DESCRIPTION AND SPECIFICATION

3.1 CONFIGURATION OF THE BASIC SENSORS.

Initially the different Sensors have some default functions, as described in this datasheet.

Further configuration of sensors are defined on system basis, through a configuration process on **Vicotee Web Portal**.

- Selection of optional function. (For the sensors with this possibility)
- Parameter setting for the selected function(s).
- Physical property unit of measurements.

This gives a freedom to use sensors in several different applications.

Just configure sensor in **Vicotee Web Portal**, and use sensor in your application.

3.2 TEMPERATURE SENSOR (AMBIENT TEMPERATURE)



Temperature sensor

Temperature Sensor (Ambient Temperature) (Note 1)				
	Parameters	Min.	Typ.	Max
	Temperature Operating range	-40 °C		+85 °C
	Accuracy @-10°C to +85°C			+/-0.4 °C
	Accuracy @-40°C to -10°C: +/- (0.0167*(40-Temperature)+0.4) °C			+/-0.9 °C
	Response Time (Note 2)	@Δt 63% of final value	20 sec	
		@Δt 95% of final value	1 min	
		@Δt 99% of final value	2 min	
	Measure Interval			
Notes:				
1. No note.				
2. Time to reach specified % of final value in response to a change in temperature (Δt). Response time will vary dependent on ambient thermal mass contacting Node and air-flow.				

3.3 HUMIDITY SENSOR (RELATIVE HUMIDITY)



← Humidity sensor

Humidity Sensor (Relative Humidity) (Note 1)				
Parameters		Min.	Typ.	Max
Relative Humidity Operating Range (Note 2)		0% RH		100% RH
Accuracy @ 0-80%RH				+/-4% RH
Accuracy @ 80-100%RH +/- (0.15*(%RH-80)+ 4) %RH				+/-7% RH
Response time (Note 3)	@ ΔRH 63% of final value			20 s
	@ ΔRH 95% of final value			1 min
	@ ΔRH 99% of final value			2 min
Measure Interval				

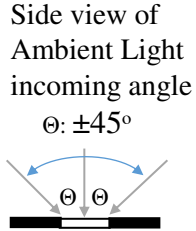
Notes:

1. No note.
2. Recommended humidity operating range is 20% to 80% RH (non-condensing) over -10 °C to 60 °C. Prolonged operation beyond these ranges may result in a shift of sensor reading, with slow recovery time.
3. Time to reach specified % of final value in response to a change in Relative Humidity (ΔRH). Response time will vary dependent on ambient air-flow.

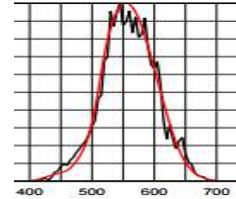
3.4 AMBIENT LIGHT SENSOR



Ambient Light Window

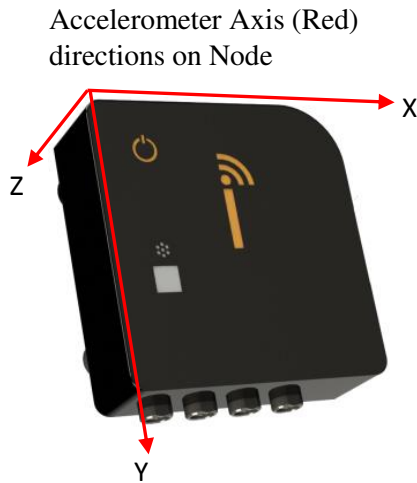


Spectral Response

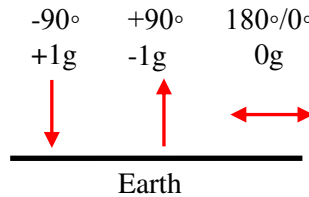


Ambient Light Sensor (Note 1)				
Parameters		Min.	Typ.	Max
Spectral Response (Human Eye)		420nm		670nm
Peak Spectral Response			550nm	
Light sensitivity	Range	0.0 lux		83865 lux
	Resolution		20.48 lux	
Normalized Light Sensitivity at different angles.	$\theta = \pm 0^\circ$		1.0	
	$\theta = \pm 30^\circ$		0.78	
	$\theta = \pm 45^\circ$		0.5	
	$\theta = \pm 70^\circ$		0.18	
Measure Interval				
Notes:				
1. No note				

3.5 ACCELEROMETER 3-AXIS



X,Y,Z Axis at static tilt.
Vertical and horizontal
Tilt(degrees) vs g_value.



General calculation:
Tilt(degrees)=
(-Arcsine(g_value))°

Accelerometer can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration results from motion or shock. Its high resolution (3.9 mg/LSB) enables measurement of inclination changes less than 1.0°. Special sensing functions specified below are provided. Additional functions will be available.

Accelerometer 3-Axes		(Note 1)		Min.	Typ.	Max
	Acceleration (Default)	Acceleration range all axis A,Y,Z		0		+2g
		Accuracy	>= 0.1s		0,5g	
		@ stable acceleration	>= 0.5s		0.1g	
		Measure Intervals				
	Tilt sensing/detection (Default)	Tilt range all axis A,Y,Z				360 degree
		Accuracy	>= 0.1s		+ 3 degree	
		@ no acceleration	> 0.5s		+ 2 degree	
		Measure Intervals				
	Free fall detection (Configurable) Note 2	Threshold configure range for g_value on axis X,Y,Z		0.3g		0.5g
		Time below threshold configure range		100ms		350ms
		Occurrence interval				
	Movement detection (Configurable) Note 2	Threshold configure range for g_value on axis X,Y,Z		0.3g		0.5g
Time above threshold configure range		100ms		350ms		
Occurrence interval						

Notes

- Parameter 'g_value' means the measured value on the individual X,Y,Z axis of accelerometer, either it comes from a static acceleration of gravity, or it comes from a dynamic acceleration of movement. The g_value is measured in 'g', a physical constant defined equal to static acceleration of gravity on earth. 1g =9.8m/s². Configuration and measurements can be executed on one, two or three axis.
- An Occurrence is met when the functions parameters passes its configured limits. Then the Node will send an Occurrence message to system (application).

4 MIB MODELS INTERFACE DESCRIPTION AND SPECIFICATION

4.1 CONFIGURATION OF THE MIB MODEL INTERFACES, BASED ON SPECIFIC SENSORS.

Initially the different interfaces on MIB Models are defined only in type, pinout, electrical parameters, etc., as described in this datasheet.

Configuration of interfaces are defined on system basis, through a configuration process on **Vicotee Web Portal**.

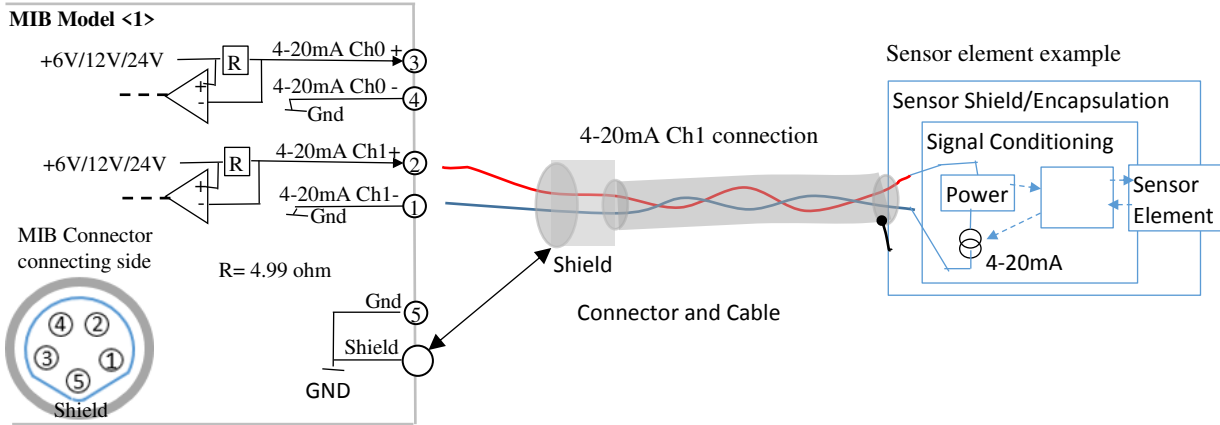
- Interface Variants
- Timing
- Protocol
- Physical property unit of measurements.

This gives a freedom to connect a multitude of sensor types, with different implementation of interfaces.

Just find the sensor(s) and interface specification, connect sensor, configure sensor in **Vicotee Web Portal**, and use sensor in your application.

4.2 4-20 mA DUAL CHANNEL (SOURCING)

MIB MODEL <1>



Ch0 and Ch1 are identical, except for pinout.

The 4-20mA Current Loop receiver has Sourced Power to supply an external sensor with power.

4-20mA Ch0 / Ch1		DC Characteristics MIB Model <1>					
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max	
3	4-20mA Ch0+ Ch0+	O	Sourced Power	@ +6V	+5.5V	+6.0V	+6.5V
			(Configurable for one of three different output voltages)	@ +12V	+11,0V	+12.0V	+13.0V
				@ +24V	+23,0V	+24.0V	+25.0V
				Sourced Power change @ 4-20mA current variation	20mV		100mV
			Internal High Side Current sense resistor	4,97	4.99 ohm	5,01	
4	4-20mA Ch0-	I	Current Return Voltage(V _{CR}) @ I _{CR(MAX)} =20mA			0.1V	
1	4-20mA Ch1-		Current Loop Accuracy			1%	
			Measurement Interval				

Gnd / Shield		DC Characteristics MIB Model <1>				
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
5	Gnd	-	Voltage on Gnd (V _{Gnd}) by definition (Note 1)	0V		0V
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		0V

Note 1: Gnd is the reference voltage for all signals/power on MIB Model <1>, if nothing else is specified.

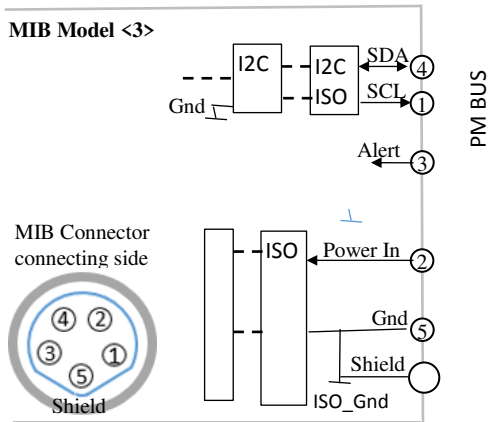
4.3 4-20 mA DUAL CHANNEL (SINKING)

MIB MODEL <2>

TBD

4.4 ISOLATED: PMBUS, POWER IN

MIB MODEL <3>



Isolated: PMBUS DC Characteristics MIB Model <3>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
4	SDA (I2C Serial Data)	I/O	Low Level Input Voltage (V _{IL}): @ I _{IL(TYPICAL)} =0.7mA : Low Level Input Current (I _{IL}): @ 0V < V _{IL} < 0.8V High Level Input Voltage (V _{IH}): @ I _{OL(MAX)} =-2.2mA :	Max 0,8V		
1	SCL (I2C Serial Clock)	O	Low Level Input Voltage (V _{IL}): @ I _{IL(MAX)} =0.7mA : High Level Input Voltage (V _{IH}): @ I _{OL(MAX)} =-2.2mA : High Level Output Voltage (V _{OH}): @ I _{OH(MAX)} =-1.6mA :	Max 0,8V		
3	Alert	I	Alarm signal In Low Level Input Voltage (V _{IL}): @ I _{IL(MAX)} =-0.7mA :	Max 0,8V		

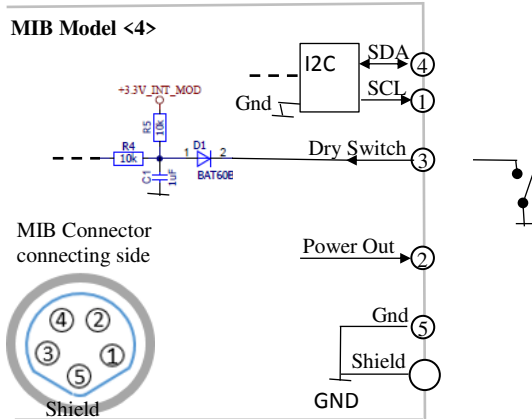
Isolated: Power In DC Characteristics MIB Model <3>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
2	Power In	I	Power In is for powering Node from external Power source. Power In Voltage(V _{POW}) @ I _{SUPPLY(MAX)} = 30mA : Power In Current(I _{SUPPLY}):	3.3V		24V 500mA

Isolated: Gnd / Shield DC Characteristics MIB Model <3>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
5	Gnd	-	Voltage on Gnd (V _{GND}) by definition (Note 1)	0V		0V
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		0V

Note 1: Gnd is the reference voltage and return connection for all signals/power on MIB Model <3>, if nothing else is specified.

4.5 I2C, DRY SWITCH, POWER OUT

MIB MODEL <4>



I2C DC Characteristics MIB Model <4>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
4	SDA (I2C Serial Data)	I/O	Low Level Input Voltage (V _{IL}): @ I _{IL(TYPICAL)} =-0.7mA:	Max 0,8V		
			Low Level Input Current (I _{IL}): @ 0V < V _{IL} < 0.8V	-0.5mA - - 0.75mA		
1	SCL (I2C Serial Clock)	O	TBD			
			Low Level Input Voltage (V _{IL}): @ I _{IL(MAX)} =-0.7mA :	Max 0,8V		
			High Level Input Voltage (V _{IH}): @ I _{OL(MAX)} =-2.2mA :	Min 2.0V		

Dry Switch DC Characteristics MIB Model <4>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
3	Dry Switch	I	TBD			
			Low Level Input Voltage (V _{IL}): @ I _{IL(TYPICAL)} =-0.7mA:	Max 0,8V		

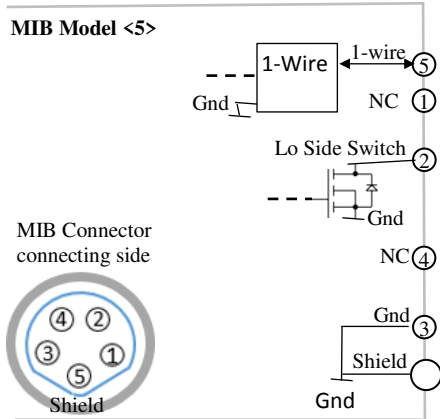
Power Out DC Characteristics MIB Model <4>							
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max	
2	Power Out	O	Power Out is for powering external connected sensors.				
			Power Out Voltage(V _{POW}) @ I _{SUPPLY(MAX)} = 30mA :	2.8V		3.6V	
			Power Out Current(I _{SUPPLY}):	30mA			

Gnd / Shield DC Characteristics MIB Model <4>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
5	Gnd	-	Voltage on Gnd (V _{GND}) by definition (Note 1)	0V		0V
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		0V

Note 1: Gnd is the reference voltage and return connection for all signals/power on MIB Model <4>, if nothing else is specified.

4.6 1-WIRE, LOW SIDE SWITCH

MIB MODEL <5>



1-Wire DC Characteristics MIB Model <5>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
5	1-Wire	I/O	Low Level Input Voltage (V _{IL}): I _{IL} (Typical)=-0.7mA :	Max 0,8V		
			Low Level Input Current (I _{IL}): @ 0V < V _{IL} < 0.8V	-0.5mA -- 0.75mA		
			High Level Input Voltage (V _{IH}): @ I _{OL} (MAX)=-2.2mA :	Min 2.0V		
			High Level Output Voltage (V _{OH}) @ I _{OH} (MAX)=-1.6mA :	V _{pow} - 0.3V	V _{pow} +0.3V	
			Low Level Output Voltage (V _{OL}) @ I _{OL} (MAX)=-2.2mA :	Max 0.2V		

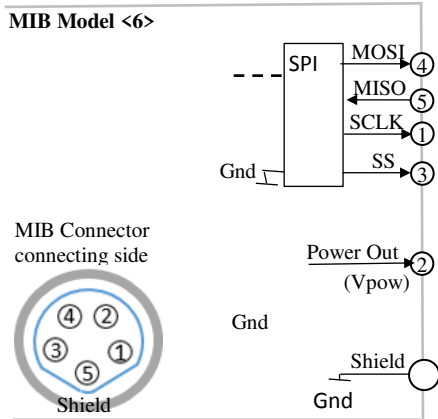
Lo Side Switch DC Characteristics MIB Model <5>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
2	Lo Side Switch	O	High Level Voltage Max (V _{MAX}) @ I _{OH} (MAX)=-1.6mA :	TBD		
			Low Level Output Voltage (V _{OL}) @ I _{OL} (MAX)=-2.2mA :	Max 0.2V		
			High Level Output Voltage (V _{OH}) @ I _{OH} (MAX)=-1.6mA :	V _{pow} - 0.3V	V _{pow} +0.3V	

Gnd / Shield DC Characteristics MIB Model <5>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
3	Gnd	-	Voltage on Gnd (V _{Gnd}) by definition (Note 1)	0V		
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		

Note 1: Gnd is the reference voltage and return connection for all signals/power on MIB Model <5>, if nothing else is specified.

4.7 SPI, POWER OUT

MIB MODEL <6>



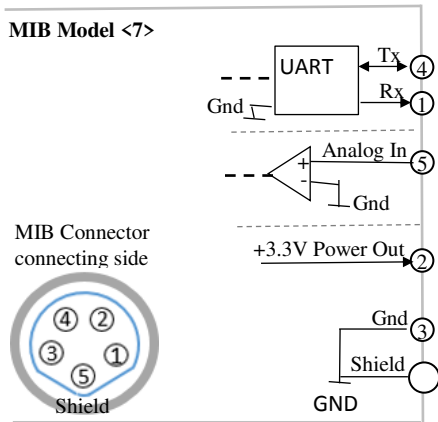
SPI DC Characteristics MIB Model <6>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
4	MOSI (Master Out Slave In)	O	High Level Output Voltage (V _{OH}) @ I _{OH(MAX)} =-1.6mA :	V _{POW} - 0.3V		V _{POW} +0.3V
			Low Level Output Voltage (V _{OL}) @ I _{OL(MAX)} =-2.2mA :			+0.2V
5	MISO (Master In Slave Out)	I	Low Level Input Voltage (V _{IL}) @ I _{I(MAX)} =-0.7mA :	-0.3V		+0.6V
			High Level Input Voltage (V _{IH}) @ I _{OL(MAX)} =-2.2mA :	+2.0V		V _{out} +0.3V
TBD						
1	SCLK (Slave Clock)	O	High Level Output Voltage (V _{OH}) @ I _{OH(MAX)} =-1.6mA :	V _{POW} - 0.3V		V _{POW} +0.3V
			Low Level Output Voltage (V _{OL}) @ I _{OL(MAX)} =-2.2mA :			+0.2V
3	SS (Slave Select)	O	High Level Output Voltage (V _{OH}) @ I _{OH(MAX)} =-1.6mA :	V _{POW} - 0.3V		V _{POW} +0.3V
			Low Level Output Voltage (V _{OL}) @ I _{OL(MAX)} =-2.2mA :			0.2V

Power Out DC Characteristics MIB Model <6>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
2	Power Out	O	Power Out is for powering external connected sensors.			
			Power Out Voltage(V _{POW}) @ I _{SUPPLY(MAX)} = 30mA :	2.8V		3.6V
			Power Out Current(I _{SUPPLY}):			30mA

Gnd / Shield DC Characteristics MIB Model <6>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
-	Gnd	-	Gnd is not on connector. Only internal in MIB			
			Voltage on Gnd (V _{Gnd}) by definition (Note 1)	0V		0V
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		0V
<p>Note 1: Gnd/Shield is the reference voltage and return connection for all signals/power on MIB Model <6>, if nothing else is specified.</p> <p>Note 2: Shield must be used for external Gnd connections, since there is no separate Gnd pin In this MIB Model.</p>						

4.8 UART, ANALOG IN, POWER OUT

MIB MODEL <7>



UART DC Characteristics MIB Model <7>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
4	Tx (Transmit Data)	O	High Level Output Voltage (V _{OH}) @ I _{OH(MAX)} =1.6mA : Low Level Output Voltage (V _{OL}) @ I _{OL(MAX)} =-1.6mA :	V _{POW} - 0.3V	TBD	V _{POW} +0.3V +0.2V
1	Rx (Receive Data)	I	Low Level Input Voltage (V _{IL}) : @ I _{I(LMAX)} =-0.7mA : High Level Input Voltage (V _{IH}) : @ I _{I(LMAX)} =-2.2mA :	-0.3V	TBD	+0.6V V _{out} +0.3V

Analog In DC Characteristics MIB Model <7>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
5	Analog In	I	Analog Voltage In Input Voltage ranges (V _{in}) More than 0.2V? Resolution	0V	TBD	10V 10 bit

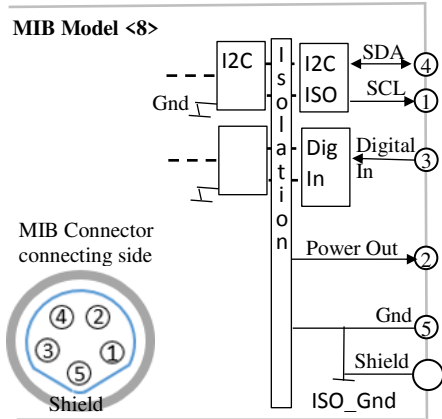
Power Out DC Characteristics MIB Model <7>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
2	Power Out	O	Power Out is for powering external connected sensors. Power Out Voltage(V _{POW}) @ I _{SUPPLY(MAX)} = 30mA : Power Out Current(I _{SUPPLY}):	2.8V		3.6V 30mA

Gnd / Shield DC Characteristics MIB Model <7>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
3	Gnd	-	Voltage on Gnd (V _{Gnd}) by definition (Note 1)	0V		0V
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		0V

Note 1: Gnd is the reference voltage and return connection for all signals/power on MIB Model <7>, if nothing else is specified.

4.9 ISOLATED: I2C , DIGITAL IN, POWER OUT

MIB MODEL <8>



Isolated: I2C DC Characteristics MIB Model <8>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
4	SDA (I2C Serial Data)	I/O	Low Level Input Voltage (V _{IL}): @ I _{IL(TYPICAL)} =-0.7mA : Low Level Input Current (I _{IL}): @ 0V < V _{IL} < 0.8V	Max 0,8V		-0.5mA -- 0.75mA
1	SCL (I2C Serial Clock)	O	TBD Low Level Input Voltage (V _{IL}): @ I _{IL(MAX)} =-0.7mA : High Level Input Voltage (V _{IH}): @ I _{OH(MAX)} =-2.2mA :	Max 0,8V		Min 2.0V

Isolated: Digital In DC Characteristics MIB Model <8>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
3	Digital In	I	Alarm signal In Low Level Input Voltage (V _{IL}): @ I _{IL(MAX)} =-1mA :	Max 0,8V		

Isolated: Power Out DC Characteristics MIB Model <8>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
2	Power Out	O	Power Out is for powering external connected sensors. Power Out Voltage(V _{POW}) @ I _{SUPPLY(MAX)} = 30mA : Power Out Current(I _{SUPPLY}):	2.8V		3.6V 30mA

Isolated: Gnd / Shield DC Characteristics MIB Model <8>						
Pin	Signal Name	Dir.	Parameters	Min.	Typ.	Max
5	Gnd	-	Voltage on Gnd (V _{Gnd}) by definition (Note 1)	0V		0V
Shield	Shield	-	Voltage on Shield. (Internal connected to Gnd.)	0V		0V

Note 1: Gnd is the reference voltage and return connection for all signals/power on MIB Model <8>, if nothing else is specified.

5 MESH NETWORK

Mesh Networking in Vicotee Njord Nodes is based on the SmartMesh IP Dust network from Linear Technology. A SmartMesh IP network consists of a self-forming multi-hop mesh of nodes, known as motes, which collect and relay data, and a network manager that monitors and manages network performance and security, and exchanges data with a host application.

Radio specification					
Parameter	Condition	Min	Typ	Max	Units
Frequency Band		2.4000		2.4835	GHz
Transmitter Output Power	Delivered to a 50Ω load				
High Calibrated Setting			8		dBm
Low Calibrated Setting			0		dBm
Receiver Sensitivity	Packet Error Rate (PER) = 1%		-93		dbm
Receiver Saturation	Maximum Input Level the Receiver Will Properly Receive Packets		0		dBm
Range (Note 1)			50		m

Notes:

- Actual RF range is subject to a number of installation-specific variables including, but not restricted to ambient temperature, relative humidity, presence of active interference sources, line-of-sight obstacles, and near-presence of objects (for example, trees, walls, signage, and soon) that may induce multipath fading. As a result, range varies.

6 POWER UP AND NETWORK CONNECTION



Turn On Switch

Note:

Before Powering On, the Node must be registered in the Vicotee WEB Portal.

Follow Startup instructions in Vicotee User Manual before going further.



LED Indicator

Node is Powered On (activated) by pressing Turn On Switch for 1-2 s. This is verified by a flashing sequence in the LED Indicator.

The LED Indicator will flash until connection has been established.

The only way to turn off the Node is now through Vicotee WEB Portal.

7 POWER REQUIREMENTS

Power requirement pr. Node varies depending node and network configuration.

Main affecting parameters are:

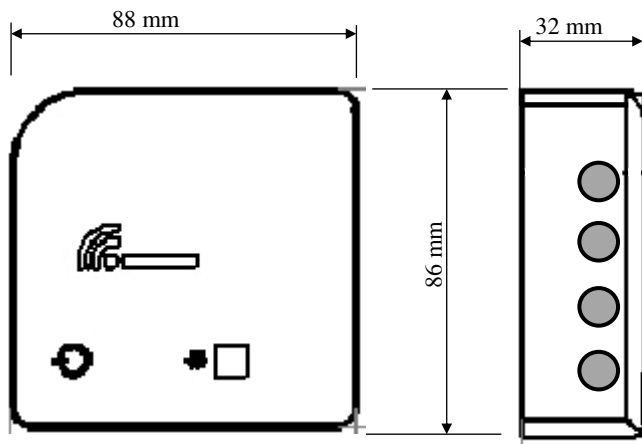
- Types of sensors connected and activated
- Number of sensors connected and activated
- Measurement Intervals

Node Power Requirement				
Parameter	Condition	Min	Typ	Max
Quiescent current (No external sensors)	Network connected. No Network communication. (Note 1)		50 uA	
Peak current (No external sensors)	Network connected. Network communication. No external sensors (Note 2) @ 10ms pr. Measurement interval			10mA
Mean current (No external sensors) Basic Node	Network connected. Network communication. No external sensors (Note 2) @ 20ms pr. Measurement interval.	1 s	300uA	
		10 s	120 uA	
		1 min	103 uA	
		2 min	102 uA	
		5 min		
Total Mean current (4 pcs Low Current (1mA) sensors)	Network connected. Network communication. 4 pcs. external Low Current (1mA) sensors @ 20ms pr. Measurement interval.	1 s	380 uA	
		10 s	130 uA	
		1 min	110uA	
		2 min	102uA	
		5 min	101 uA	
Mean current (4 pcs High Current (20mA) sensors)	Network connected. Network communication. 4 pcs. external High Current (20mA) sensors @ 20ms pr. Measurement interval.	1 s	1,9 mA	
		10 s	280 uA	
		1 min	130 uA	
		2 min	120 uA	
		5 min	110 uA	
Notes:				
<ol style="list-style-type: none"> 1. When connected to network, but the network is at a minimum of activity, no sensor data transfer, just network maintaining. 2. Ongoing Network communication lasts for just about 10ms for each measurement interval (packet transfer). This period is called Peak Current. In time between Network communications, Power requirements are close to quiescent current 				

8 ENVIRONMENTAL

Parameter	Condition	Min	Typ	Max	Units
Storage Temperature Range		-20		70	°C
Operating Temperature Range		-20		50	°C
Temperature Ramp Rate	While operating in Network	-8		+8	°C/Min
Storage and Operating Relative Humidity	Non-Condensing			90	%RH
Protection rating			IP66		

9 DIMENSIONS & MOUNTING



4 pcs. Magnets for magnetic mounting of Node

