

TDC Development Support Board for Siemens Wireless Modules

Introduction

The TDC Development Support Board (DSB) is intended to assist engineers and designers in developing and evaluating Siemens Wireless modules.

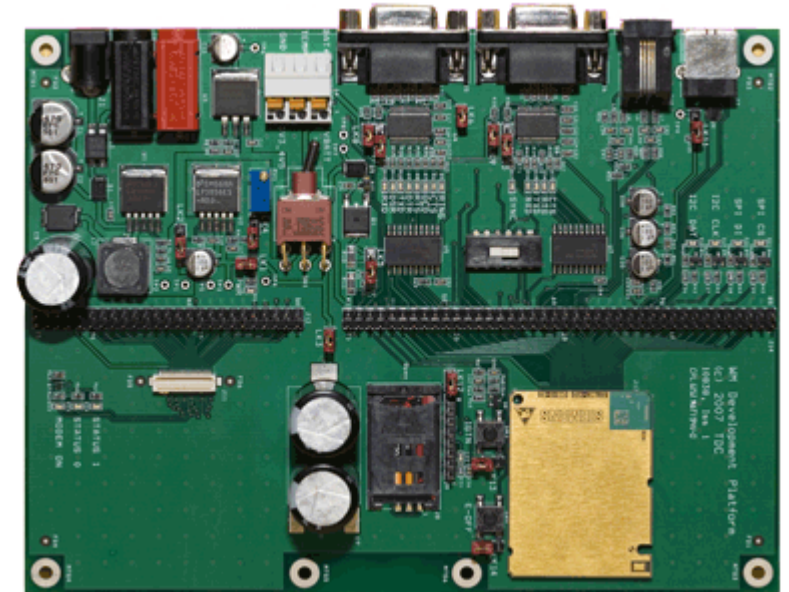
The board supports a number of modules from Siemens, covering GSM, GPS, GPRS, EDGE and 3GSM (HSDPA) technologies. The board is available only as part of a kit (TDCDSB-NM-ISSUE-3), which includes:

- Software, documentation & utilities CD
- Plastic mounting feet (4)
- G70 12V Power supply
- G60-ML Mains cable
- Antennas (1 x dual band whip, 1 x GSM/GPS combi)

Please specify the module you need when ordering the development board kit.

Although not currently illustrated, the board is supplied with a bracket that mounts on the two centre mounting holes, and carries a UFL to FME connector for GSM operation, and UFL to SMA for GPS.

The board will only support one module at a time. **UNDER NO CONDITIONS MUST MORE THAN ONE MODULE BE FITTED at the same time.** Damage will occur to both the modules and the board.



Last update - 17th April 2008



TDC Development Support Board for Siemens Wireless Modules

Quickstart

Not much to say here, apart from checking that the jumpers are fitted in accordance with the settings in the [overview](#) section for default operation.

Make sure the board is on a clutter-free area so that the back of the board does not short out on anything and connect the serial cable to a suitable terminal or terminal emulation program. The recommended initial data rate is 115,200bps, N parity, eight data bits and 1 stop bit. Switch off hardware handshaking at this stage.

Connect power and the serial cable to J5 (serial port 0). Switch on the unit by pressing the IGN switch for about a second - the Module OFF LED should switch off, and the SYNC LED should start flashing. You don't need a SIM fitted at this stage, or even an antenna, but if you do fit them, then the SYNC LED should start to flash with a short flash once the module has registered to the network.

Open the serial port, and send the characters 'ATI' plus carriage return to the DSB. You should see a message identifying the module returned. If not, then check the connections or check that you are communicating with the right modem! - a common mistake is to find that your terminal connection is to a modem already installed inside the computer being used.



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TDC Development Support Board for Siemens Wireless Modules

Overview

This board is a platform for engineers to develop GSM/GPRS, EDGE, 3G, or combined GSM/GPRS/GPS tracking products using Siemens modem modules. The platform can be powered by either the supplied power supply or a 9 - 15V bench supply via the 4mm sockets, and has all of the most commonly used interfaces available including 2 x RS232 ports, USB, Audio, I2C and SPI. The second serial port can easily be configured as a null modem connection using a simple slider switch making it ideal for interfacing GPS receivers, data loggers, etc. For those interested in the power supply side of things a battery charging circuit is provided along with a fairly flexible power supply circuit which allows for a certain amount of experimentation including the use of super caps.

TDC's development board has been put together with the engineer in mind and has several useful test points, jumper connectors, and LEDs to aid the design/evaluation process. In addition to these features every single pin of the module can be accessed directly via an array of pin headers wired to mimic their surface mount counterparts. To make it easy to find the signals required TDC have included as many useful labels onto the board as possible and provide full circuit diagrams.

There are three connectors fitted to this board to support the latest range of Siemens modules.

- 80 way Molex connector to support TC63, TC65, MC75, XT65, and XT75
- 50 way Hirose connector (J11) to support HC15 and HC25
- 50 way Hirose connector (J15) to support MC55i

Connectors

Connector Description

J1	4mm Jack plug, 9-15 volt input, positive on centre conductor
J2	4mm Banana plug power input, positive, 9-15 volts
J3	4mm Banana plug power input, negative
J4	Battery connector
J5	Serial port 0 / ASC 0
J6	Serial port 1 / ASC 1
J7	USB B connector
J8	Sim holder
J9	0.1" SIL breakout connector, replicating J8
J10	RJ11 connector for handset
J11	50 way Hirose DF12 connector for HC15 or HC25 modems
J12	0.1" DIL breakout connector, replicating J11
J13	80 way Molex connector for TC63, TC65, MC75, AC75, XT65, XT75 modems
J14	0.1" DIL breakout connector, replicating J13
J15	50 way Hirose DF12 connector for MC55i

Links

Link	Description	Factory setting
LK1	Disconnect power to the module	Fitted
LK2	3V3_4V5 Power shutdown	Not connected
LK3	Isolate reservoir capacitor	Fitted
LK4	Bypass RV1	Not connected
LK5	Fast Charge	Not connected
LK6	DTR Serial Port 0	Fitted
LK7	SHDNn	Not fitted
LK8	ONLINEn	Fitted
LK9	ONLINE1n	Fitted
LK10	SHDN1n	Not fitted
LK11	USB POWER	Not fitted
LK12	CCIN	Fitted
LK13	IGTN	Not connected
LK14	E-OFF	Not fitted
LK15	VCHARGE	Fitted

Switches

Switch Description

SW1	Battery disconnect
SW2	DTE/DCE select (null modem) for Serial port 1 / ASC 1
SW3	Ignition (manual modem switch on)
SW4	Emergency off

LK16	Audio power selection	Fitted across pins 1 & 2
LK17	Chargegate	Fitted

'Fitted' = jumper fitted and shorting pins, 'Not connected' = jumper supplied, but not shorting pins, 'Not fitted' = no jumper supplied.

Test Points

Ref Description

TP1	5V reference
TP2	GND reference
TP3	3V3_4V5 output from regulator
TP4	Super cap / 3V3_4V5 reference point
TP5	GND reference
TP6	3V output from regulator
TP7	VCHARGE reference
TP8	GND reference
TP9	USB +V

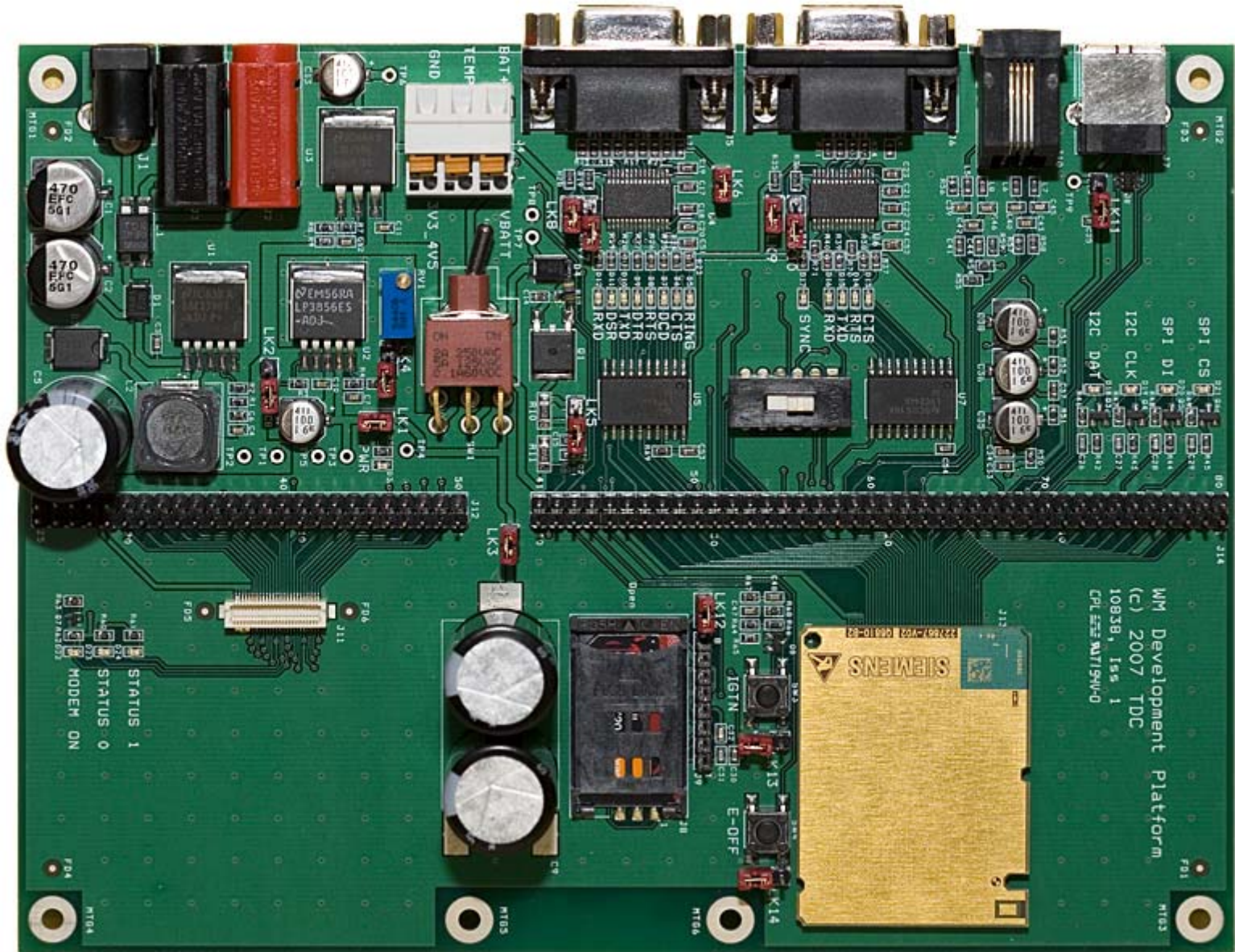
All of the [connectors](#), [switches](#) and [links](#) are described in detail elsewhere via the hyperlinks.

Board dimensions : 135mm x 178mm x 30mm.

Current consumption : Typical <200mA, charging 400mA (typical), online 900mA (maximum, dependent on module used) - preliminary figures, awaiting characterisation.

Power supply 9-15V DC, power supply should be capable of 1A continuous.

Mounting holes - 3mm diameter.



Please note that this photograph is an early version, and slightly different to the shipped version.

TDC Development Support Board for Siemens Wireless Modules

Connectors

J1 - 4mm Main power

Pin	Description
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Centre	Positive power input, 9-15V
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Outer	Negative power input
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J2 - 4mm banana plug main power

Pin	Description
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Main (Red)	Positive power input, 9-15V
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J3 - 4mm banana plug main power

Pin	Description
-----	-------------

Main (Black)	Positive power input, 0V / GND
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J4 - Battery Connector

Pin	Description
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GND	Ground connection
-----	-------------------

TEMP	NTC input from battery
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BAT+	Positive connection
------	---------------------

Push down on the tabs to insert battery terminal wires.

Please note that only battery types specified by Siemens must be used. Batteries without protection circuits must NOT be used.

J5 - Serial port 0 / ASC0

J10 - Handset, RJ11

Pin	Description
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1	MIC N
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2	EAR N
---	-------

3	EAR P
---	-------

4	MIC P
---	-------

J11 - 50 Way Hirose Connector

To fit Siemens HC15 or HC25 modems. Please see Siemens documentation for details of pinout.

DO NOT FIT A MODULE TO J13 IF A MODULE IS FITTED TO J11 OR J15.

J12 - 0.1" DIL Breakout Connector

Pin	Description	Description	Pin
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1	CCLK	VMIC	50
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2	CCVCC	MICP	49
---	-------	------	----

3	CCIO	MICN	48
---	------	------	----

4	CCRST	EPP	47
---	-------	-----	----

5	CCIN	EPN	46
---	------	-----	----

6	CCGND	AGND	45
---	-------	------	----

7	SDCC_D2	SDCC_D3	44
---	---------	---------	----

8	SDCC_D0	SDCC_D1	43
---	---------	---------	----

9	SDCC_CLK	SDCC_CMD	42
---	----------	----------	----

10	GND	IGT	41
----	-----	-----	----

11	PWR_IND	EMERG_OFF	40
----	---------	-----------	----

12	STATUS0	APP_CTRL0	39
----	---------	-----------	----

13	STATUS1	RSV38	38
----	---------	-------	----



Pin Description

- 1 DCD - Data Carrier Detect
- 2 RXD - Received Data
- 3 TXD - Transmit Data
- 4 DTR - Data Terminal Ready
- 5 GND
- 6 DSR - Data Set Ready
- 7 RTS - Request To Send
- 8 CTS - Clear To Send
- 9 RING - Ring Detect

J6 - Serial port 1 / ASC1

Pin Description

- 1 NC - No connect
- 2 RXD - Received Data
- 3 TXD - Transmit Data
- 4 NC - No connect
- 5 GND
- 6 NC - No connect
- 7 RTS - Request To Send
- 8 CTS - Clear To Send
- 9 NC - No connect

J7 - USB B Jack

Pin Description

- 1 USBVCC
- 2 USBDN
- 3 USBDP
- 4 GND

J8 - SIM Card Holder

Pin Description

- 1 VCC
- 2 RESET

14	USBVCC	APP_CTRL1	37
15	USBDP	RCV36	36
16	USBDN	APP_CTRL2	35
17	USBID	DEV_WU	34
18	VDDL	RSV33	33
19	RSV19	HOST_WU	32
20	RSV20	VEXT	31
21	GND21	BATT30	30
22	GND22	BATT29	29
23	GND23	BATT28	28
24	GND24	BATT27	27
25	GND25	BATT26	26

J13 - 80 Way Molex Connector

To fit Siemens TC63, TC65, MC75, AC75, XT65 or XT75 modems. Please see Siemens documentation for details of pinout.

DO NOT FIT A MODULE TO J11 IF A MODULE IS FITTED TO J13 OR J15.

J14 - 0.1" DIL Breakout Connector for J13

Pin Description

- 1 GND1
- 2 ADC1_IN
- 3 ADC2_IN
- 4 GND4
- 5 GPIO10
- 6 GPIO8
- 7 SPID1
- 8 GPIO7
- 9 GPIO6
- 10 GPIO5
- 11 I2CCLK / SCLK (MC55i)
- 12 VUSB_IN
- 13 DAI5
- 14 ISENSE
- 15 DAI6

Description Pin

- GND80 80
- DAC_OUT 79
- PWR_IND 78
- RSV77 77
- GPIO9 76
- SPICS 75
- GPIO4 74
- GPIO3 73
- GPIO2 72
- GPIO1 71
- I2CDAT 70
- USB_DP 69
- USB_DN 68
- VSENSE 67
- VMIC 66

3 CLOCK
 4 GND
 5 VPP
 6 DATA

J9 - SIM Card Breakout

Pin Description

1 CCVCC
 2 CCRST
 3 CCCLK
 4 CCGND
 5 CCGND
 6 CCIO
 7 CCGND
 8 CCIN

16 CCCLK	EPN2 65
17 CCVCC	EPP2 64
18 CCIO	EPP1 63
19 CCRST	EPN1 62
20 CCIN	NICN2 61
21 CCGND	MICP2 60
22 DAI4	MICP1 59
23 DAI3 / RXDDAI (MC55i)	MICN1 58
24 DAI2 / TFSDAI (MC55i)	AGND 57
25 DAI1 / TXDDAI (MC55i)	IGT 56
26 DAI0 / RFSDAI (MC55i)	EMERG_RST 55
27 BATT_TEMP	DCD0 54
28 SYNC	CTS1 53
29 RXD1	CTS0 52
30 RXD0	RTS1 51
31 TXD1	DTR0 50
32 TXD0	RTS0 49
33 VDDL	DSR0 48
34 VCHARGE / POWER (MC55i)	RING0 47
35 CHARGE / CHARGE (MC55i) VEXT_80 / VDD (MC55i)	46
36 GND36	BATT45 45
37 GND37	BATT44 44
38 GND38	BATT43 43
39 GND39	BATT42 42
40 GND40	BATT41 41

J15 - 50 Way Hirose Connector

To fit Siemens MC55i modules. Please see Siemens documentation for details of the pinout. The signals for this connector are also available on J14 (see above table for details).

DO NOT FIT A MODULE TO J15 IF A MODULE IS ALREADY FITTED TO J11 OR J13.



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Switches

SW1 - 3V3_4V5 / VBATT

When in the 3V3_4V5 position the module will be powered by the main power source and the BAT+ terminal of the battery connector will be open circuit. In the VBATT position the modem is either battery powered or in battery charge mode depending upon whether or not the link on the VCHARGE line is connected (LK?).

SW2 - DTE / DCE

With the switch positioned to the top of the board, Serial Port 1 / ASC1 is a DCE. In the lower position, DTE operation is selected. This mode will be useful if you are connecting to another modem device (such as serial to WiFi or GPS unit for example) when controlling them from Java code on the module.

SW3 - IGTN

The module can be manually switched on with a momentary operation of this switch.

SW4 - E-OFF

To operate an 'Emergency Off' operation, this switch can be pressed. Please note that for correct operation of the modules, they should be switched off using the AT^SMSO command. This de-registers the module in an orderly and controlled fashion with the network. Using E-OFF or simply disconnecting main power should be avoided.



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TDC Development Support Board for Siemens Wireless Modules

Links

LK1 - Disconnect power to the module

When fitted, this link connects the power supply derived from the DC input to the module. Breaking this link allows users to insert an ammeter into the circuit for a more realistic measure of the power being drawn by the modem.

This link also allows the evaluation of a 'super' capacitor. By inserting a resistance at this point to mimic a weaker power supply the system designer can evaluate the capacitor's ability to supply the large gulps of current taken during a GSM/GPRS transmit burst. To aid testing the voltage on this power supply line is adjustable using RV1 (2.8 to 4.5V).

LK2 - 3V3_4V5 Power shutdown

When fitted, this link will turn off the regulator responsible for supplying power to the module from the main DC input.

LK3 - Isolate the reservoir capacitor

Removing this link will isolate the super capacitor or large electrolytic capacitors (depending on what is fitted) from the circuit.

LK4 - Bypass RV1

When fitted this link bypasses the variable resistance RV1 giving a fixed supply to the module of 4.5V. With RV1 enabled the supply to the module can be varied between 2.8V to 4.5V.

LK5 - Fast Charge

When charging a battery the maximum current limit can be changed from 500mA to 1A by fitting LK5.

LK6 - DTR disconnect, Serial port 0

When fitted, this link connects DTR to the modem, allowing the modem to power up via the serial port.

LK7 - SHDNn

When fitted, this link will disable Serial Port 0, saving power and allowing other serial devices to be connected to the breakout connectors without conflict.



LK8 - ONLINE_n

When fitted, the output of Serial Port 0 is switched off after 100µS of inactivity, therefore saving power. When not fitted, the serial port is active all the time.

LK9 - ONLINE_{1n}

When fitted, the output of Serial Port 1 is switched off after 100µS of inactivity, therefore saving power. When not fitted, the serial port is active all the time.

LK10 - SHDN_{1n}

When fitted, this link will disable Serial Port 1, saving power and allowing other serial devices to be connected to the breakout connectors without conflict.

LK11 - USB Power

When fitted, supplies 5V from the board onto the USB port. Most host devices will supply their own voltage to this pin, so use this pin with care, as power supply conflicts may occur if the jumper is fitted.

LK12 - CCIN

When fitted, this link simulates the CCIN (sim detect) feature that is present on some SIM card holders.

LK13 - IGTN

Shorts the ignition input to the modem, or allows for an external switch to be fitted.

LK14 - E-OFF

Shorts the emergency off switch, but allows for an external switch to be fitted.

LK15 - VCHARGE

When fitted this link connects 5V to the VCHARGE pin on the module. This tells the module that a charger is connected so if a battery with less than full capacity is connected the charging process will commence.

LK16 - Module Audio Selection

When using the MC55i to make audio calls LK16 must be fitted such that it connects pins 2 & 3 together. For all other modules fit the link so that pins 1 & 2 are connected.

LK17 - Chargegate

This link can be used to disconnect the Chargegate signal which controls the battery charging functionality.



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Indicators

I2C / SPI Port

LED	Colour	Description
SPI CS	Green	SPI Chip Select
I2C CLK / SPI CLK	Green	I2C or SPI Clock
I2C DAT / SPI DO	Green	I2C Data or SPI Data Out
SPI DI	Green	SPI Data In

Serial Port 0

LED	Colour	Description
RING	Red	Ring Indicator
CTS	Orange	Clear To Send
DCD	Red	Data Carrier Detect
RTS	Orange	Request To Send
TXD	Green	Transmit data
DSR	Red	Data Set Ready
RXD	Green	Receive Data

Serial Port 1

LED	Colour	Description
CTS	Orange	Clear To Send
RTS	Orange	Request To Send
TXD	Green	Transmit Data
RXD	Green	Receive Data

Sync

LED	Colour	Description
SYNC	Red	Flashes in accordance with SYNC output of modem - see AT^SYNC command

Power

LED	Colour	Description
PWR	Green	Indicates main power is applied to the board

HC15 / HC25 Status

LED	Colour	Description
STATUS 0	Green	GSM Network registration status
STATUS 1	Green	UMTS Network registration status

Modem Off

LED	Colour	Description
MODEM OFF	Green	Illuminates when modem is off

