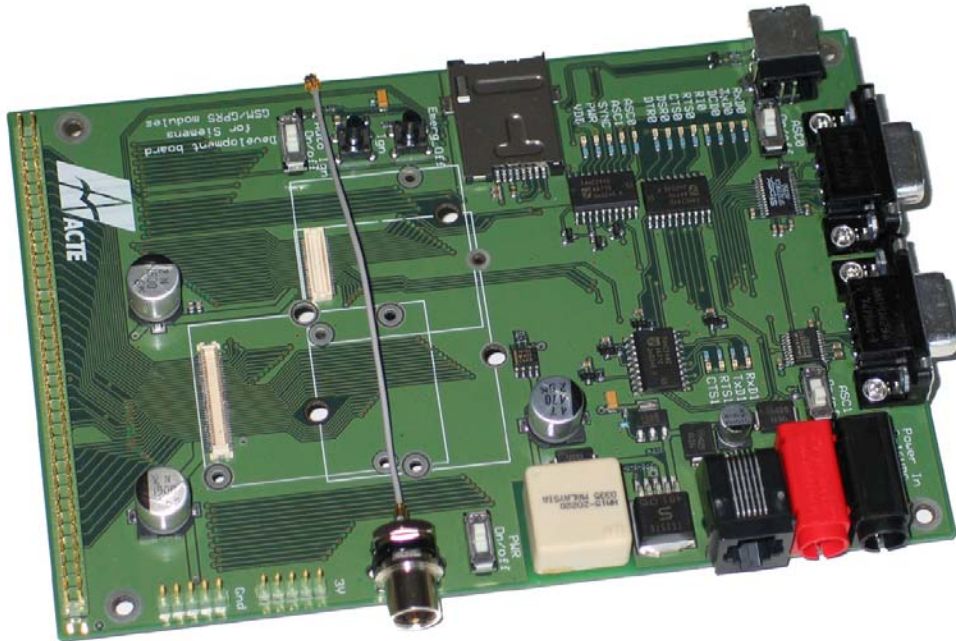


Technical Description

ACTE DB45/75 Development kit for Siemens GSM/GPRS/EDGE modules



Acte DK45/75 is a starter kit for developing wireless application in the GSM band using Siemens GSM/GPRS/EDGE modules XT65, XT75, MC75, TC65, TC63 and MC55/56.

The development kit contains all the necessary parts and documentation to start developing both the hardware and software application.

Onboard the DB45/75 board you find sockets for both 50 pin and 80 pin modules, power supply, SIM card holder, interface buffers, RS232 serial ports and test pins for all the signals.

The power supply have both RJ12 and 4mm connectors. The sockets for the modules are positioned in a colliding position i.e. only one module can be used at any one time.

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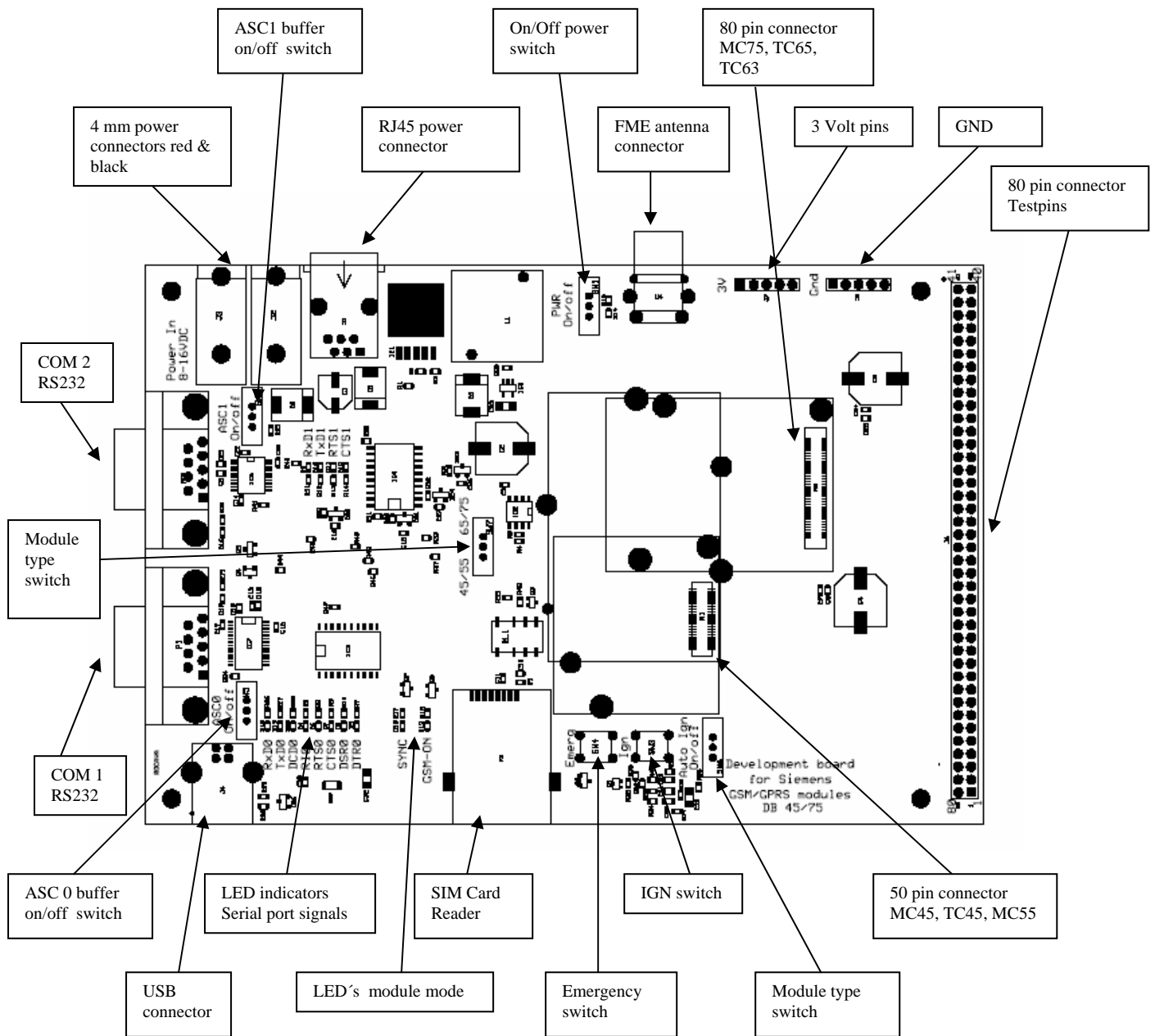


Fig. 1 DB45/75 PCB component side

Description of the input/output connectors

P1 Serial port connector, ASC0

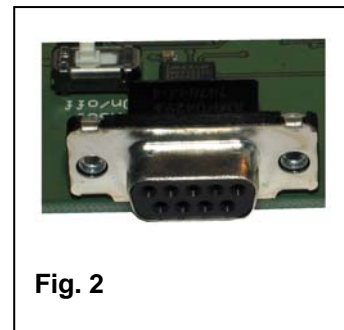
This is a full DB9-F serial port RS232 compatible. The 1st serial interface of the DB45/75 is intended for the communication between the GSM module and the host application. This RS-232C interface is a data and control interface for transmitting data, AT commands and providing multiplexed channels etc. All modem status lines are available.

A level converter adapts and inverts the V.24 signals (2.65V level) from the GSM module to RS-232C level.

The output lines are switched off (high impedance) while the GSM module is in **POWER DOWN** mode. Therefore the **PWR_IND** signal is used to enable and shut down converters.

The rising edge of the DTR line voltage generates an ignition signal (impulse) via the RC-net circuit so that it is possible to turn on the GSM module from the host, by plugging in the serial cable or by control from the application.

Pin #	Name	I/O	Description
1	DCD	O	Data Carrier Detect
2	RxD	O	Receive Data
3	TxD	I	Transmit Data
4	DTR	I	Data Terminal Ready
5	GND	-	Signal Ground
6	DSR	O	Data Signal Ready
7	RTS	I	Request To Send
8	CTS	O	Clear To Send
9	Ri	O	Ring Indicator



P2 Serial port connector, ASC1

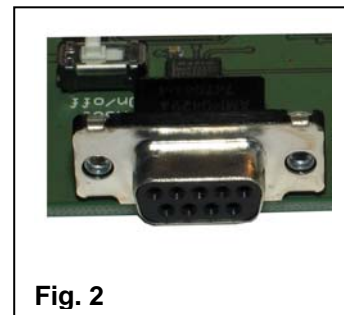
This is a minimum equipped DB9-F serial port, RS 232C compatible. Only four signals and ground are available. The 2nd serial interface of the DB45/75 is intended for the communication between the GSM module and the host application. This RS-232C interface includes only the data lines RXD/TXD for transmitting GPRS data and AT commands, and the two control lines RTS/CTS.

A level converter adapts and inverts the V.24 signals (2.9V level) from the GSM module to the RS-232C level.

The output lines are switched off (high impedance) if the GSM module is in **POWER DOWN** mode.

Therefore the **PWR_IND** signal is used to enable and shut down converters.

Pin #	Name	I/O	Description
2	RxD	O	Receive Data
3	TxD	I	Transmit Data
5	GND	-	Signal Ground
7	RTS	I	Request To Send
8	CTS	O	Clear To Send



J4 USB serial port

A type B connector for connecting to a USB port on a PC. The Module name in use will be reported to the USB driver upon insertion of the USB cable. A USB driver is supplied from Siemens.

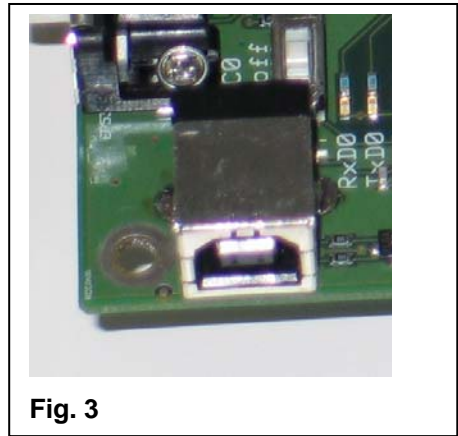


Fig. 3

J5 Test pin ground

5 pins are available for connecting test equipment or reference to board ground

J7 Test pins 3,0 Volt

5 pins are available for 3 Volt reference or use with other applications. A maximum of 50mA is allowed to draw from this point.

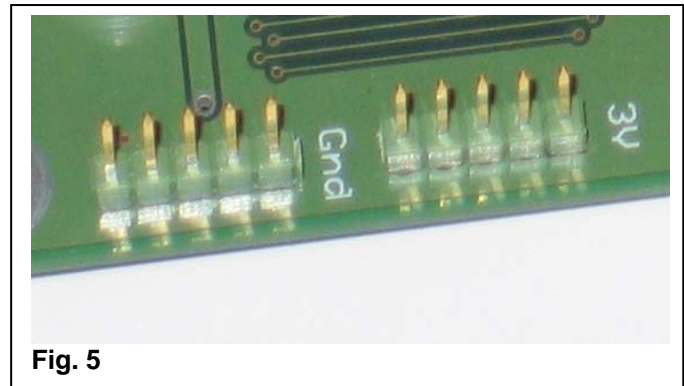


Fig. 5

SIM Card Interface

The DB45/75 has an integrated SIM card interface. An appropriate SIM card (3V or 1.8V) is required to use the GSM module. The SIM card holder P3 placed on the DB45/75 is of a push / push type from ELCO/AVX. To eject the card out of the holder simply push the card in momentarily. The pin location of the SIM card holder. The pin assignment is given below.

Pin assignment – SIM card holder F3

Pin #	Signal name	I/O	Function
C1	CCVCC	O	Supply voltage U = 2.93V (typ.) or 1.8V
C5	CCGND	O	Separate ground line for the SIM card
C2	CCRST	O	SIM card reset, prompted by the module
C6	CCVPP	-	N/C
C3	CCCLK	-	SIM card clock
C7	CCIO	I/O	Serial data line, bi-directional
CD			Connect to MC45/55 TC63/65/75
CD	CCIN	I	SIM card detection CCVCC CCGND
			SIM card inserted high low
			SIM card not inserted low high

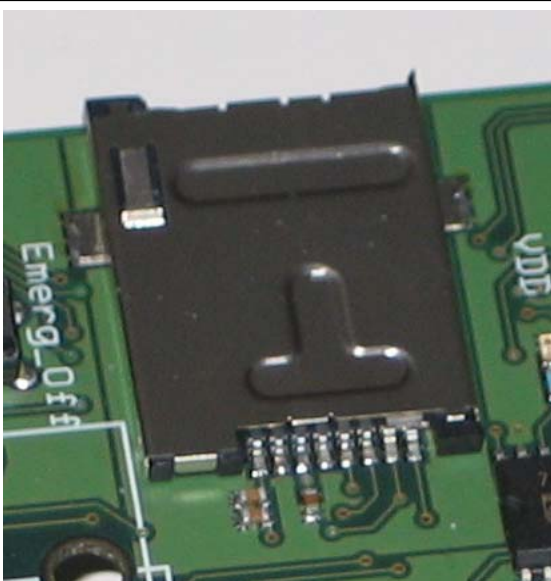


Fig. 6 Shows the SIM Card reader from the solder side

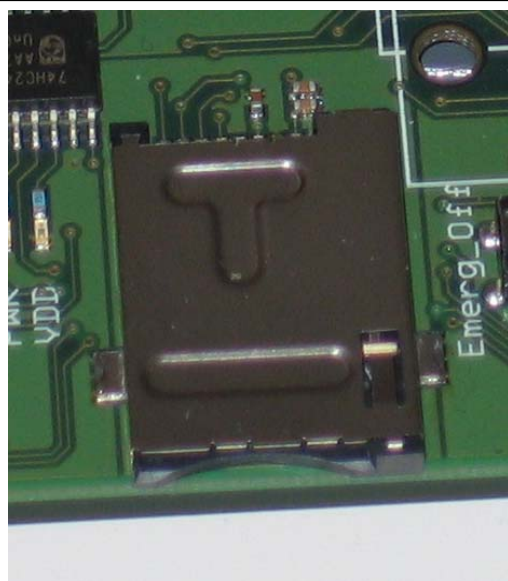


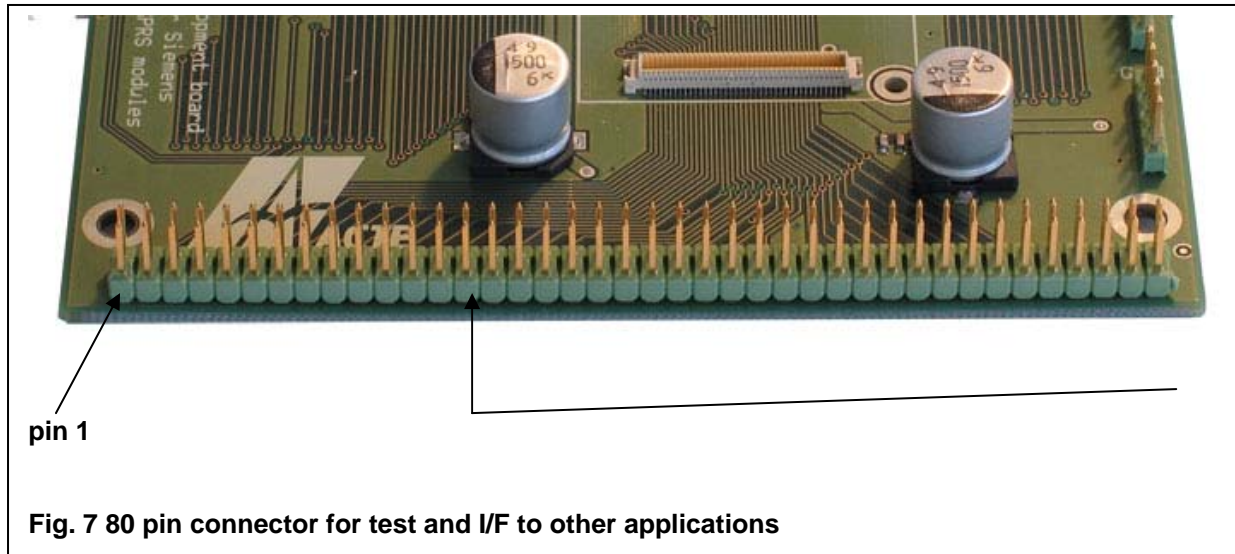
Fig. 5 Shows the SIM Card reader from the enter side

J6 Test pins

This is the area where all signals can be monitored from. The 2.54 mm spacing double row connector is numbered from bottom left ccv to pin 80 top left.

This is also where external application can interface to the GSM module I/F. In this way a complete functional test unit can be put together to test the design.

Warning! All the signals on the test pins are unprotected, please be observant and use ESD secured environment.

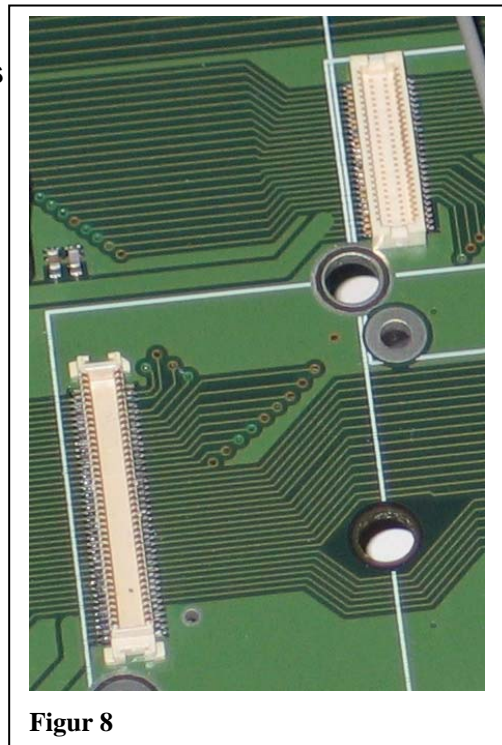


M1 & M2 Module board to board connectors

The board-to-board connector on TC65 is an 80-pin double-row receptacle and on the TC45,MC55 a 50 pin double row receptacle.

The names and the positions of the pins can be seen in table.----

The pin assignment are the same on 50 of the pins on both the M1 and the M2. On the M1 the pins from 16 to 65 are the same as on the M2 pin 1 to 50. This makes the transition from older designs to the new series of GSM modules from Siemens much simpler.



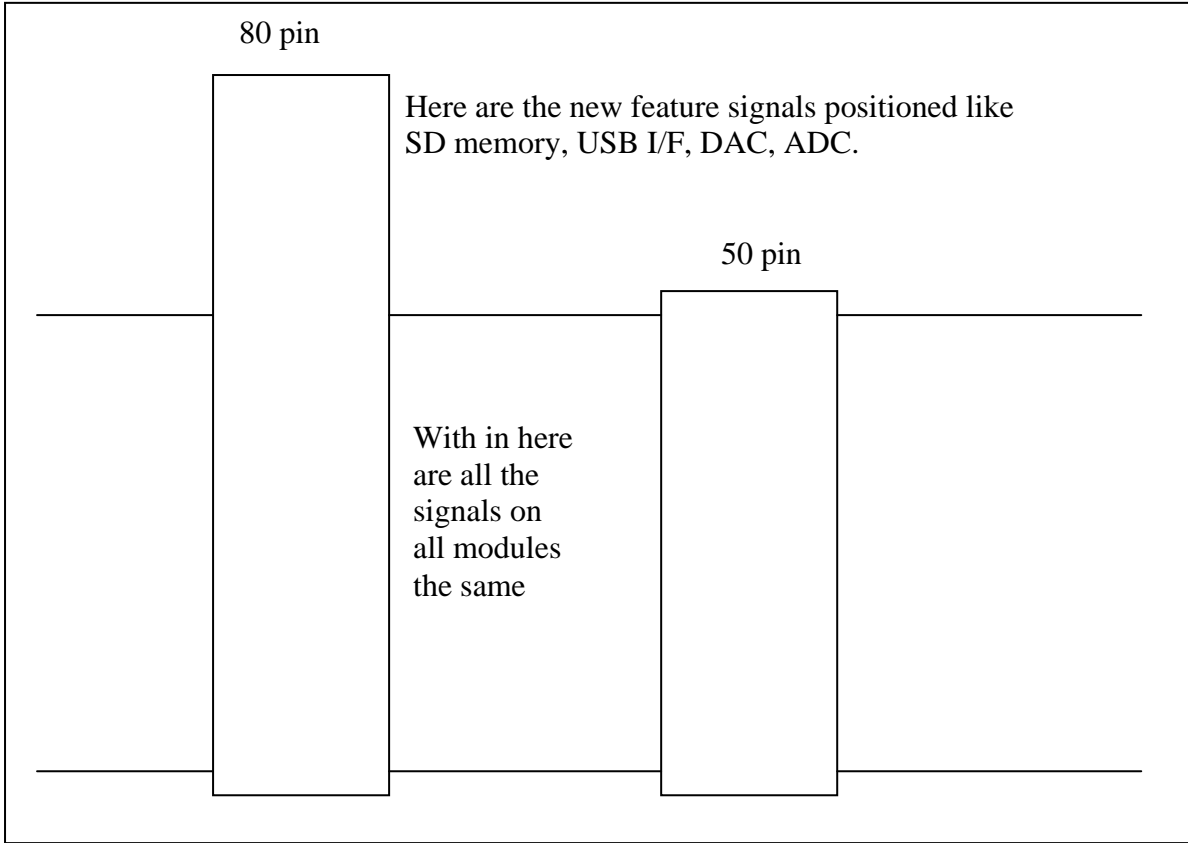


Fig 10

Pin assignment for M1 & M2

M2, 80 pin connector MC75, TC65, TC63

M1, 50 pin connector for TC45, MC55

Pin no.	Signal name	Signal name	Pin no.	Pin no.	Signal name	Signal name	Pin no.
80	GND	GND	1				
79	DAC_OUT	ADC1_IN	2				
78	PWR_IND	ADC2_IN	3				
77	TP_ENV	GND	4				
76	RXD2_GPIO9	TXD2_GPIO10	5				
75	GPIO7	SD_WP	6				
74	SD_3	GPIO8	7				
73	SD_2	SD_DET	8				
72	SD_1	SD_CMD	9				
71	SD_0	SD_CLK	10				
70	I2CDAT	I2CCLK	11				
69	USB_DP	VUSB_IN	12				
68	USB_DN	USC5	13				
67	VSENSE	ISENSE	14				
66	VMIC	USC6	15				
65	EPN2	CCCLK	16	50	EPN2	CCCLK	1
64	EPP2	VSIM	17	49	EPP2	CCVCC	2
63	EPP1	CCIO	18	48	EPP1	CCIO	3
62	EPN1	CCRST	19	47	EPN1	CCRST	4
61	MICN2	CCIN	20	46	MICN2	CCIN	5
60	MICP2	CCGND	21	45	MICP2	CCGND	6
59	MICP1	USC4	22	44	MICP1	RXDDAI	7
58	MICN1	USC3	23	43	MICN1	TFSDAI	8
57	AGND	USC2	24	42	GND	SCLK	9
56	IGT	USC1	25	41	IGT	TXDDAI	10
55	EMERG_RST	USC0	26	40	EMERGOFF	RFSDAI	11
54	DCD0	BATTEMP	27	39	DCD0	BATTEMP	12
53	CTS1	SYNC	28	38	CTS1	SYNC	13
52	CTS0	RXD1	29	37	CTS0	RXD1	14
51	RTS1	RXD0	30	36	RTS1	RXD0	15
50	DTR0	TXD1	31	35	DTR0	TXD1	16
49	RTS0	TXD0	32	34	RTS0	TXD0	17
48	DSR0	VDDL	33	33	DSR0	VDDL	18
47	RING0	VCHARGE	34	32	RING0	POWER	19
46	VEXT	CHARGE	35	31	VDD	CHARGE	20
45	BATT+	GND	36	30	BATT+	GND	21
44	BATT+	GND	37	29	BATT+	GND	22
43	BATT+	GND	38	28	BATT+	GND	23
42	BATT+	GND	39	27	BATT+	GND	24
41	BATT+	GND	40	26	BATT+	GND	25

Fig. 11

U4 Antenna connector

An FME Bulkhead to U.FL coaxial connector cable assembly is supplied in order to make the antenna connection as good as possible. Any type of GSM antenna can be connected to the FME male connector, make sure the antenna or antenna cable is of a FME female type.



Fig. 12

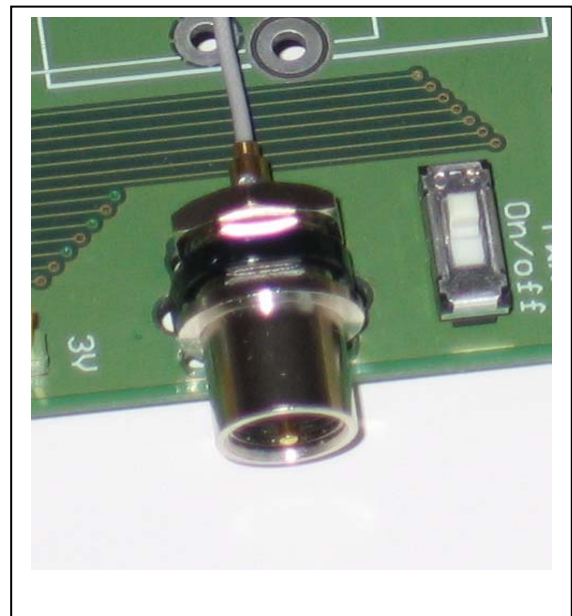


Fig.13

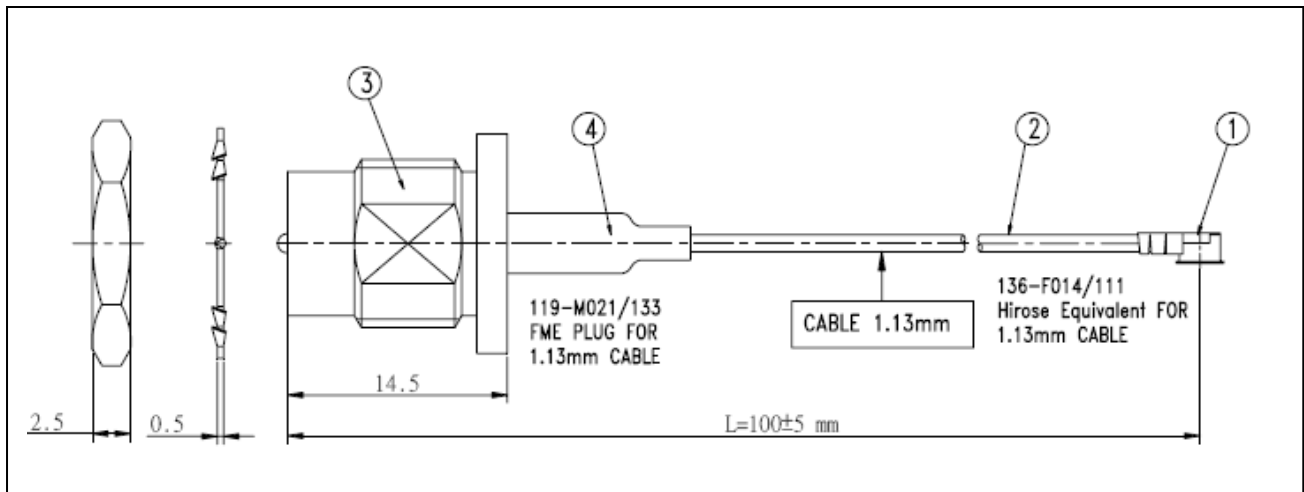


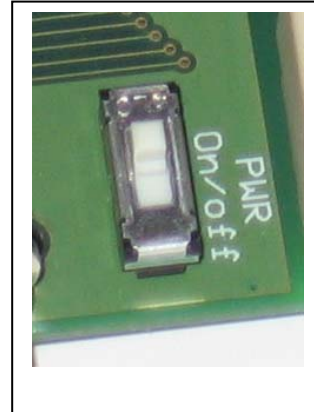
Fig.14

- 1 U.FL coaxial connector
- 2 Coaxial cable RG
- 3 FME Bulkhead connector thread and nut on the outside
- 4 Heatshrink tube

Description of switches

SW1 Power ON/OFF

This switch is the main power switch for the complete board and module



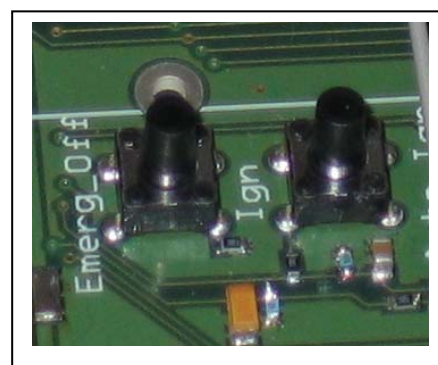
SW2 Serial port ASC1 on/off

This switch allows you to disable the serial port level converter for ASC1.



SW3 IGN/IGT

To switch on TC45 the /IGT (Ignition) signal needs to be driven to ground level for at least 100ms and not earlier than 10ms after the last falling edge of VDD.
To switch on the MC75, TC65, TC63 The IGN/IGT line needs to be driven low for at least 300ms.



SW4 Emergency

The emergency switch has different function depending on which module is being used. For MC55/TC45 this is a shut down switch and needs to be pressed for >3 seconds. In the case of MC75/TC65/TC63 it is a reset switch and needs to be pressed for < 1second.

Use the EMERG_RST pin only when, due to serious problems, like if the software is not Responding within 5 seconds. Pulling the EMERG_RST pin causes the loss of all information stored in the volatile memory since the processor restarts immediately. Therefore, this procedure is intended only for use in case of emergency, i.e. if MC75 does not respond, if reset or shutdown via AT command fails.

SW5 ASC0 ON/OFF

This switch allows you to disable the serial port level converter for ASC0

SW6 Auto ign ON/OFF

This switch allows auto ignition i.e. upon power on the module will start automatically.

SW7 Module type switch

Due to the complexity with having two different generations of module connectors and behaviour on the same board you have to switch between the different modules manually. The switch changes behaviour of the SIM Card presence and the power_indicator.

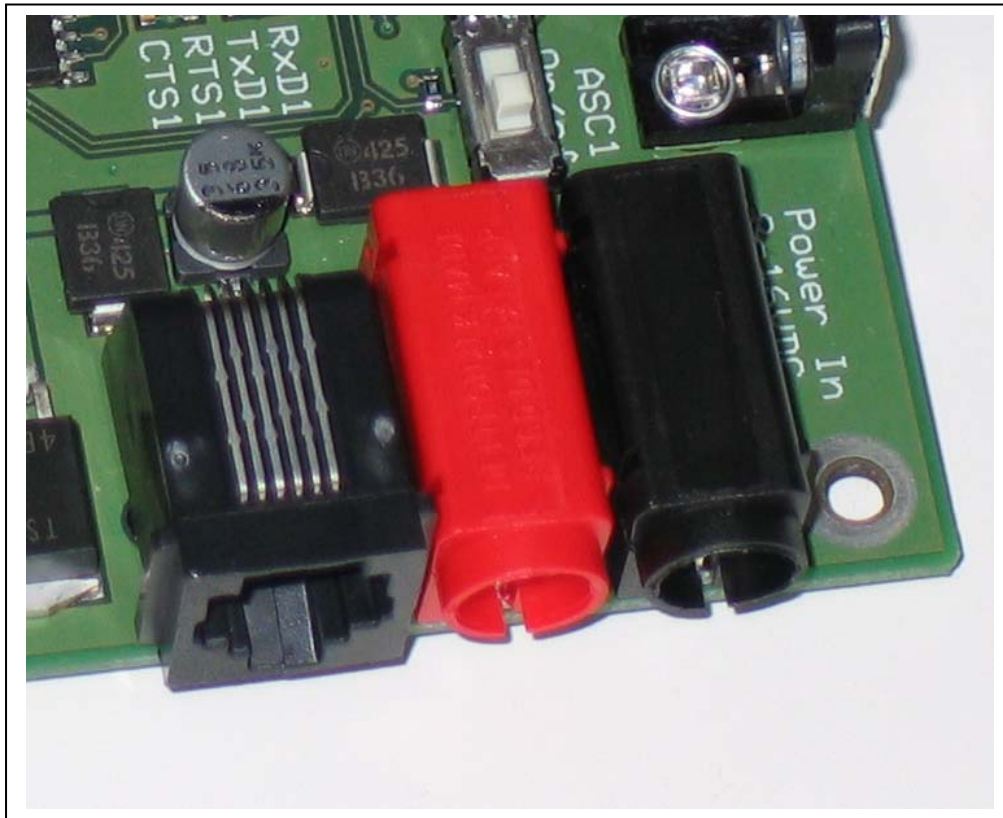
Power Supply for DB45/75

The constant voltage supply on the PCB provides all the supply voltages required for operating DB45/75 and the GSM module. The power supply source can be a 8V...16V laboratory PSU or mains adapter.

Two power supply interfaces:

- Interface J2/J3 – connects to a laboratory PSU for supplying the DB45/75 itself and the connected GSM module.
- Interface J1 (RJ45) - connects to an external Mains adapter for supplying the DB45/75 itself and the connected GSM module. This adapter can be the same as for the MC45 Terminal

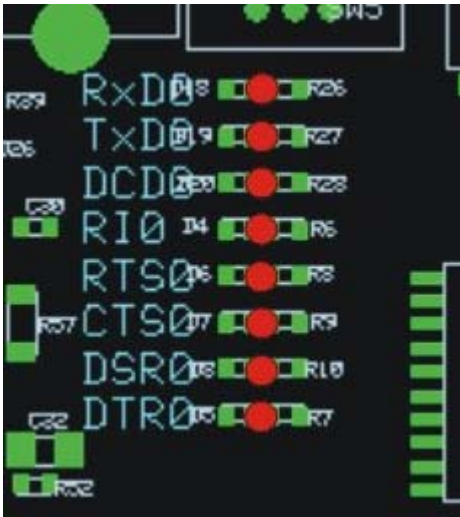
Pin	Voltage	Connector	Color
J1	+12 & ground	RJ45	Black
J2	+8V...+16V	4 mm PCB jack	Red
J3	Ground	4 mm PCB jack	Black



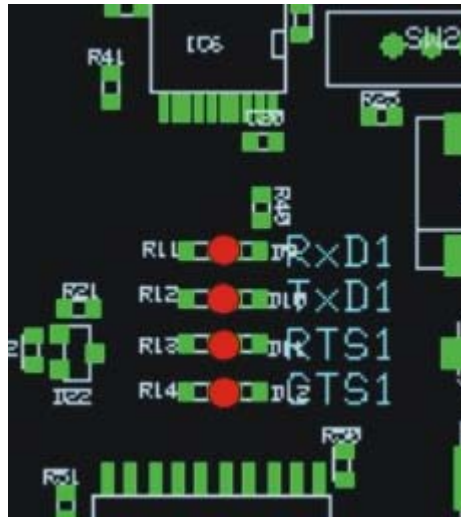
Power connectors J1, J2, J3

Status LEDs

There are LED's to indicate the signal status of the serial ports, power to the module and network connection.



LED's for serial port ASC0



LED's for serial port ASC1



LED's for Module active power and network connection



LED's for System power

Turn on the GSM Module

There are several ways to turn on the GSM module:

The major approach is to switch on the connected GSM module by pressing the ignition IGN switch. The ignition switch is located on the component side of the DB45/75.

As an alternative to the ignition key IGN, the GSM module can be activated by toggling the DTR0 signal available on the ASC0 port.

The low to high transition of the DTR0 signal from the DSUB9 connector ASC0 is formed by a RC combination.

Plugging in the USB cable to the USB connector triggers the IGT signal in the same manner as DTR0. In this case, the USB supply voltage delivered from the USB host starts the GSM module.

Auto ignition turns on the module upon power on.

Connecting the antenna and the GSM Module to DB45/75

To prevent mechanical damage, be careful not to force, bend or twist the module. In order to prevent short-circuits, ensure that the GSM module does not come into contact with any part of the DB45/75.

Follow these steps to connect the components:

- Connect the supplied RF cable to the appropriate U-FL. connector on the GSM module.
- Plug the supplied FME antenna cable into the FME connector on the DB45/75.
- Connect the 50/80-pin B2B connector of the GSM module to the 50/80-pin board-to-board connector U3/U5 of the DB45/75.

Mechanical mounting

Nuts and bolts

There is multiple choices of screws and spacers available for mounting the module on the application PCB. There is also a plastic clips available for the MC45, TC45 series modules.

Content of the Development Kit



Plastic casing
Power supply
DB45/75 PCB
CD
Serial cables
Antenna
GSM module

List of accessories

SIM Card reader

Various SIM Card readers are available on the market. Below are some of the SIM Card Readers that ACTE carries in stock.



Small and inexpensive.



Push-Push type.



Insert and close with lock mechanism

Antennas

The most common antenna connector used for GSM applications are the FME type. Small stubb antennas with FME connector or outside mounted type of antennas with low loss cable fitted with FME connector can be used.



Stubb antenna straight or 90 degree angle. FME



Puck antenna very low Profile. With FME



Glas antenna with FME

Connectors

The 50 pin board connector is of type Hirose Pitch 0,5 mm
3 mm stacking height DF 12E(3,0)-50DP
5 mm stacking height DF 12E(5,0)-50DP

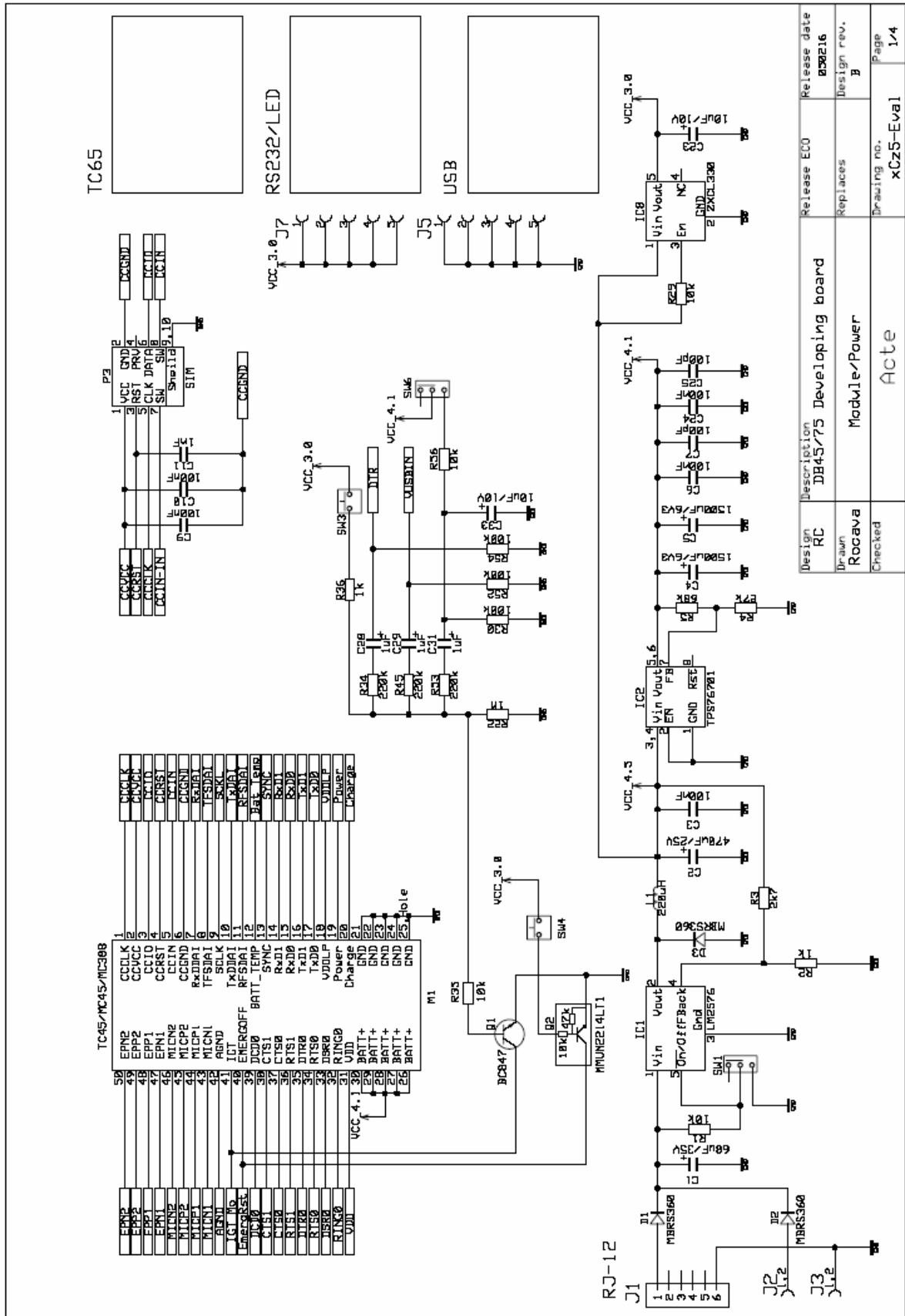
The 80 pin board connector is of type Molex Pitch 0,5 mm
3 mm stacking height 53748-0808
4 mm stacking height 53916-0808

Super Capacitors

For maximum performance we recommend to use a Super Capacitor in-between the power supply and the module. This capacitor has enough storage to supply the surge current the module need during transmission. In battery powered application the Super Cap will convert the high impedance battery to low impedance power source thus maximize the battery capacity.



Fig. GS203

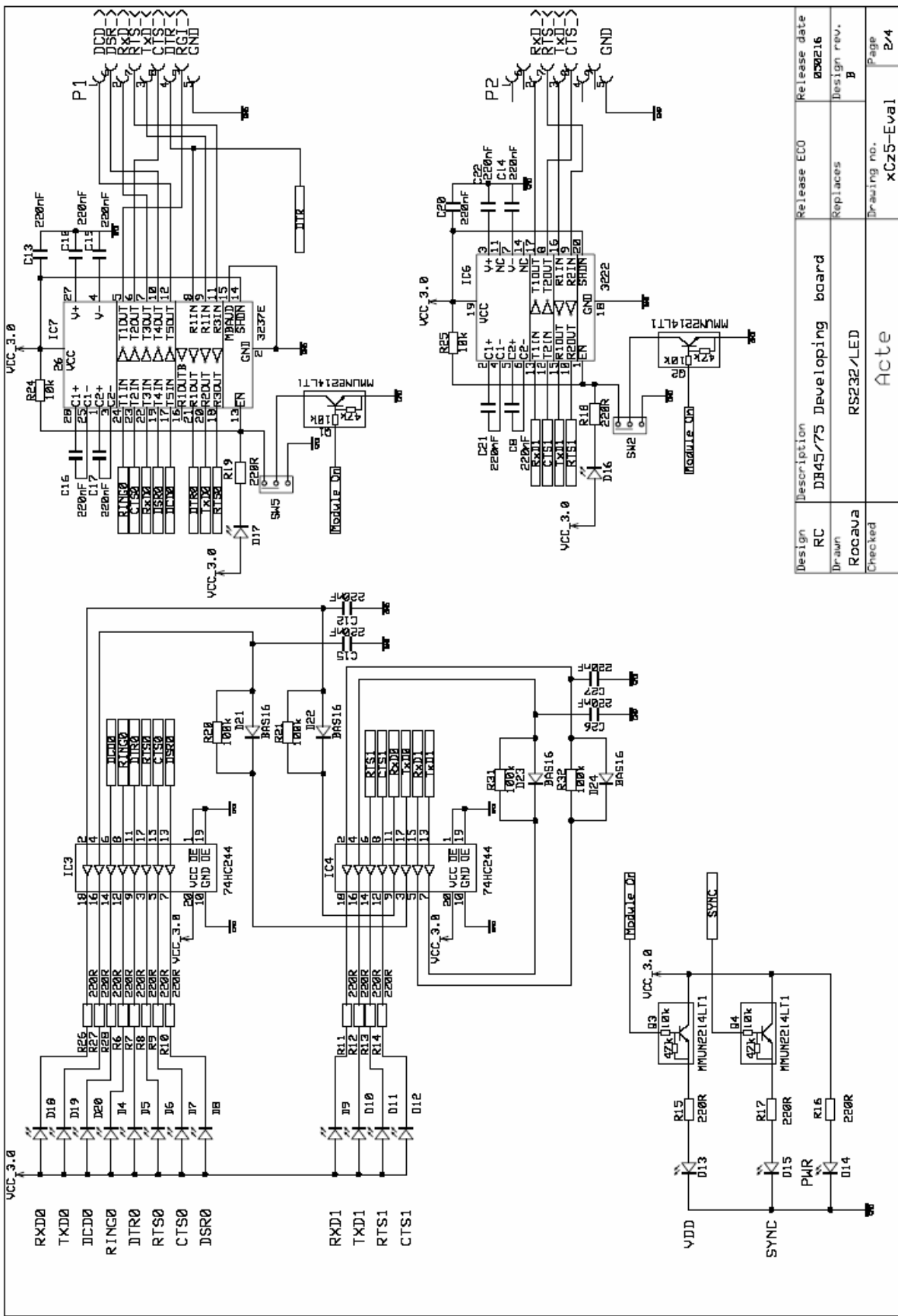


TC65

RS232/LED

USB

Design	RC	Description	DB45/75 Developing board	Release date	090216
Drawn	Rocava	Checked	Module/Power	Replaces	Design rev. 3
Drawing no.	Acte			Page	1/4
			xC25-Eval		



Design	Description	Release date
RC	DB45/75 Developing board	090216
Drawn	Replaces	Design rev.
ROCava	RS232/LED	B
Checked	Braving no.	Page
	xCz5-Eval	2/4

