mbed 'Command Module' – Adapter Board
RS-EDP-CM-mbed User Manual

Version 1.03

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Contents

1. Introduction

The mbed development module is a very useful board that introduces a new way to write embedded firmware. Instead of having a C compiler license installed upon your machine the mbed unit makes use of a C Compiler installed on a virtual host. Your software and project are built within the framework of an HTML page. The compilation is done remotely on your behalf, and the resulting binary image file is transferred to you and stored on the mbed module. By rebooting the mbed module the new image is flashed into the hardware and the mbed module runs your application code.

This is a superb way of gaining access to complex MCU's like NXP's ARM7 based devices without the requirement to purchase a full blown C compiler and debug tool. The mbed allows for writing of code, compiling of code and downloading to the target via very simple USB interface. The mbed platform comes currently as a 40 pin DIP module and software drivers for most of the hardware on the chip.

This RS-EDP-CM-mbed adapter module is designed to remap the pin out of the mbed module to that of the RS-EDP platform. The adapter module also includes a mini SD Card interface and an SPI serial connection for a small graphics LCD.

The RS-EDP platform is a system, which has been designed to utilise many different manufacturers' microprocessors. To support ARMs mbed module, the RS-EDP platform uses an adapter board to connect between the RS-EDP baseboard and the mbed module. This is referred to as the EDP-CM-mbed module.

The adapter module comes complete with a list of low level drivers that allow it to talk to the other module that form the RS-EDP system. The applications modules that are currently supported include analogue module, digital I/O module, communications module, brushed DC motor drive module MC1. A set of jumper and link options provide the user with several different ways to map the mbed to the RS-EDP.

In an RS-EDP system there is usually one Command Module (CM) and one or more Applications Modules (AM) pluged in to the Base Board (BB). This adapter board is designed to hold the mbed module and as such it will be the 'Command module' for the system.

The 'Command Module' in a system dictates whether the whole system is a 3.3V one or a 5.0V one. The module uses a 3.3V microprocessor and consequently the I/O is mostly 3.3V.
To tell the rest of the system the mbed module is a 3.3V Command Module and not a 5.0V Command Module, the Vcc_CM line on the base board is connected to 3.3V by the tracking on the adapter board. This Vcc_CM is used as a reference by the other modules, such as the analogue module, to limit the output voltage to 3.3V. The command voltage line is also used by the #RESET circuit.

The RS-EDP-CM-mbed daughter board remaps the I/O of the mbed module on to the backplane of the RS-EDP system. As there are quite a few dual function pins on the mbed module several link options have been made to accommodate the various options. Extensive use of the I2C capability is used to communicate to the application modules in the system.

2. Pin Mapping

2.1 MCU Pin Allocation

mbed Pin	**Pin Name**	Comment	RS-EDP Name
1	GND/0V	Analogue & Digital Ground	SGND
2	VIN/4.5V-9.0V	5V in from base board	5.0V
3	VB	Battery backup - 2 options	3V BAT
		Battery backup - 2 options	3.3V

4	nR	RESET input	#RESIN
5	p5/SPI11 mosi	2 link options	CNTRL_SPI_MRST
		2 link options	EVG10_GPIO58
6	p6/SPI1 miso	2 link options	CNTRL_SPI_MRST
		2 link options	EVG9_GPIO57
7	p7/SPI1 sck	2 link options	CNTRL_SPI_CLK
		2 link options	EVG8_GPIO56
8	p8	3 link options	CNTRL_SPI_#CS_NSS
		3 link options	local CS for LCD
		3 link options	EVG7_GPIO54
9	p9/Serial1 Tx/I2C1 sda		CNTRL_I2C_SDA
10	p10/Serial1 Rx/I2C1 scl		CNTRL_I2C_SCL
11	p11/SPI2 mosi	2 link options	GPIO12_MCI_CMD
		2 link options	EVM2_GPIO41_CAPADC
12	p12/SPI2 miso	2 link options	GPIO2_MCI_DAT0
		2 link options	EVM3_GPIO43
13	p13/Serial2 Tx	2 link options	GPIO10_MCI_CLK
		2 link options	ASC1_TX_TTL
14	p14/Serial2 Rx	2 link options	GPIO8_MCI_DAT3
		2 link options	local CS/SD for sd card
		2 link options	ASC1_RX_TTL
15	p15/AnalogueIn0	2 link options	AN0
		2 link options	EVM0_GPIO21
16	p16/AnalogueIn1	3 link options	AN1
		3 link options	AN10
		3 link options	EVM1_GPIO23
17	p17/AnalogueIn2/AnalogOut1	2 link options	AN2
		2 link options	IRQ_GPIO16_CNTRL_I2C_INT
18	p18/AnalogueIn3/AnalogOut1	3 link options	AN3
		3 link options	AN12
		3 link options	CPU_DACO0_GPIO17
19	p19/AnalogueIn4	2 link options	AN4
		2 link options	GPIO0
20	p20/AnalogueIn5	2 link options	AN5
		2 link options	ASC1_RX_TTL_ASC0_DSR
21	p21/PWMOut5	2 link options	CPU_DACO0_GPIO17
		2 link options	MOTORP0L
22	p22/PWMOut4	2 link options	CPU_DACO1_GPIO19
		2 link options	MOTORP1L
23	p23/PWMOut3	2 link options	EVG0_GPIO40
		2 link options	MOTORP2L
24	p24/PWMOut2	2 link options	EVG1_GPIO42
		2 link options	MOTORP0H
25	p25/PWMOut1	3 link options	EVG2_GPIO44
		3 link options	ASC1_RX_TTL
		3 link options	MOTORP1H
26	p26/PWMOut0	3 link options	EVG3_GPIO46
		3 link options	ASC1_TX_TTL
		3 link options	MOTORP2H
27	p27/I2C2 scl/Serial3 Rx	2 link options	ASC0_RX_TTL
		2 link options	EVG4_GPIO48
28	p28/I2C2 sda/Serial3 Tx	2 link options	ASC0_TX_TTL
		2 link options	EVG3_GPIO46
29	p29/CAN td	2 link options	EVG5_GPIO50
		2 link options	CAN0_TX
30	p30/CAN rd	2 link options	EVG6_GPIO52
		2 link options	CAN0_RX
31	USB d+		USB_DEV_D+
32	USB d-		USB_HOST_D-

33	Ethernet TD+		ETH_TX+
34	Ethernet TD-		ETH_TX-
35	Ethernet RD+		ETH_RX+
36	Ethernet RD-		ETH_RX-
37	IF+		USB_DEBUG_D+
38	IF-		USB_DEBUG_D-
39	VU/5.0V USB Out		not connected
40	VOUT/3.3V Reg Out		local power on led

2.2 Backplane Resources Used by the MCU

Resources Used/Available
#RESIN
3.3V
3V BAT
5.0V
AN0
AN1
AN2
AN3
AN4
AN5
AN10
AN12
ASC0_RX_TTL
ASC0_TX_TTL
ASC1_RX_TTL
ASC1_RX_TTL
ASC1_RX_TTL_ASC0_DSR
ASC1_TX_TTL
ASC1_TX_TTL
CAN0_RX
CAN0_TX
CNTRL_I2C_SCL
CNTRL_I2C_SDA
CNTRL_SPI_#CS_NSS
CNTRL_SPI_CLK
CNTRL_SPI_MRST
CNTRL_SPI_MRST
CPU_DACO0_GPIO17
CPU_DACO1_GPIO19
ETH_RX-
ETH_RX+
ETH_TX-
ETH_TX+
EVG0_GPIO40
EVG1_GPIO42
EVG2_GPIO44
EVG3_GPIO46
EVG3_GPIO46
EVG4_GPIO48
EVG5_GPIO50
EVG6_GPIO52
EVG7_GPIO54
EVG8_GPIO56
EVG9_GPIO57
EVG10_GPIO58

EVM0_GPIO21
EVM1_GPIO23
EVM2_GPIO41_CAPADC
EVM3_GPIO43
GPIO0
GPIO2_MCI_DAT0
GPIO8_MCI_DAT3
GPIO10_MCI_CLK
GPIO12_MCI_CMD
IRQ_GPIO16_CNTRL_I2C_INT
MOTORP0H
MOTORP0L
MOTORP1H
MOTORP1L
MOTORP2H
MOTORP2L
SGND
USB_DEBUG_D-
USB_DEBUG_D+
USB_DEV_D+
USB_HOST_D-

2.3 Alphabetical Listing the I/O Pins

Alphabetical Listing of IO	
36	Ethernet RD-
35	Ethernet RD+
34	Ethernet TD-
33	Ethernet TD+
1	GND/0V
38	IF-
37	IF+
4	nR
5	p5/SPI11 mosi
6	p6/SPI1 miso
7	p7/SPI1 sck
8	p8
9	p9/Serial1 Tx/I2C1 sda
10	p10/Serial1 Rx/I2C1 scl
11	p11/SPI2 mosi
12	p12/SPI2 miso
13	p13/Serial2 Tx
14	p14/Serial2 Rx
15	p15/AnalogueIn0
16	p16/AnalogueIn1
17	p17/AnalogueIn2/AnalogOut1
18	p18/AnalogueIn3/AnalogOut1
19	p19/AnalogueIn4
20	p20/AnalogueIn5
21	p21/PWMOut5
22	p22/PWMOut4
23	p23/PWMOut3
24	p24/PWMOut2
25	p25/PWMOut1
26	p26/PWMOut0
27	p27/I2C2 scl/Serial3 Rx
29	p29/CAN td
28	p28/I2C2 sda/Serial3 Tx

30	p30/CAN rd
32	USB d-
31	USB d+
3	VB
2	VIN/4.5V-9.0V
40	VOUT/3.3V Reg Out
39	VU/5.0V USB Out

2.4 Backplane Signal Names and Connections

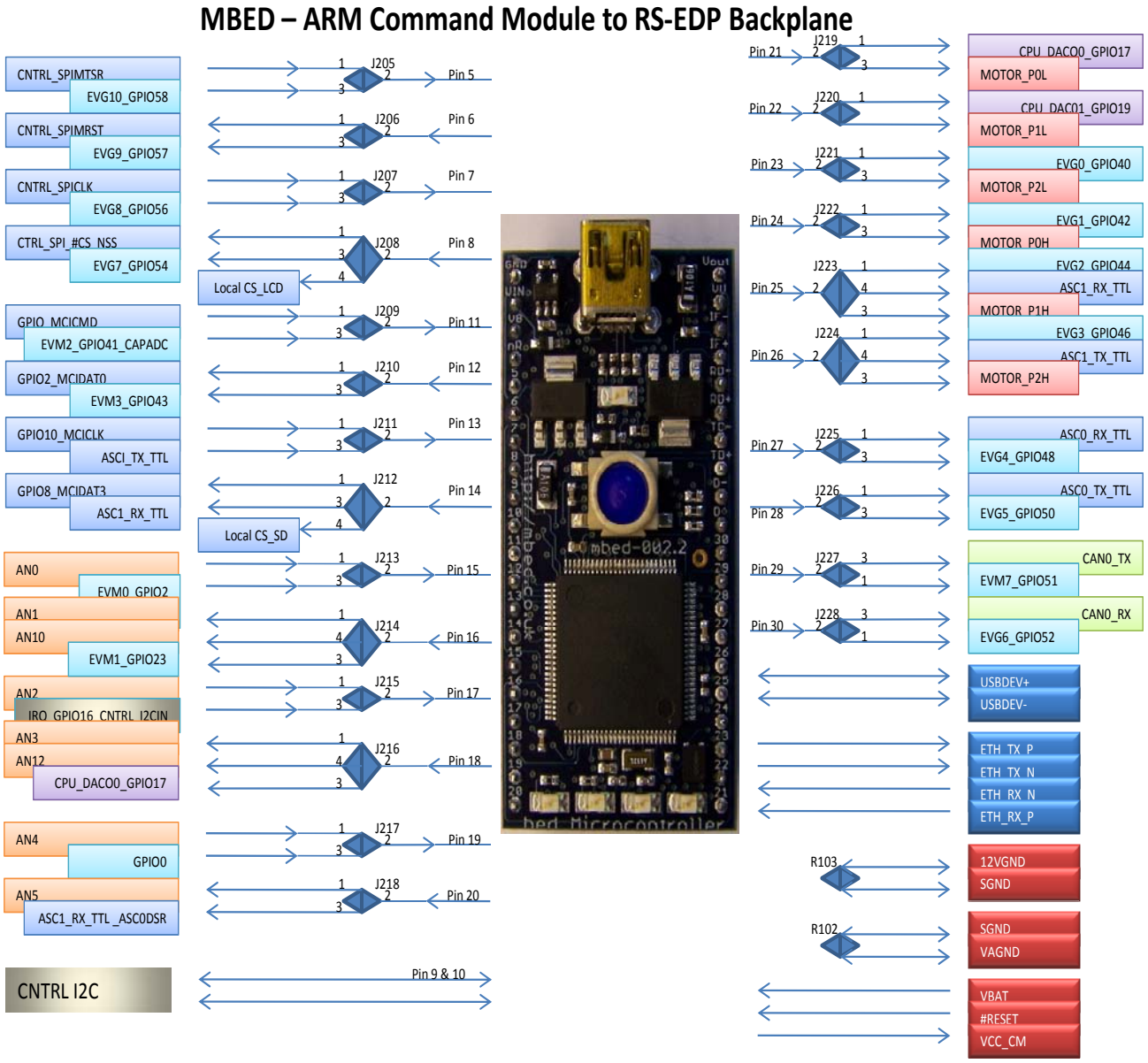
Base Board Signal Name	EDPCON1	EDPCON2	Break Out Connector	
#CS0		53 & 54		
#CS1		55 & 56		
#CS2		57 & 58		
#CS3		59 & 60		
#PSEN		51 & 52		
#RD		45 & 46		
#RESIN		1 & 2	P603	26
#RESOUT		3 & 4	P603	27
#WR		47 & 48		
#WRH		49 & 50		
12V	133		P603	47
12V	134		P603	47
12V	135		P603	47
12V	136		P603	47
12V GND	137		P603	48
12V GND	138		P603	48
12V GND	139		P603	48
12V GND	140		P603	48
3.3V	127		P603	44
3.3V	128		P603	44
3.3V		95 & 96	P603	44
3V BAT	124		P603	42
5.0V	129		P603	45
5.0V	130		P603	45
5.0V		97 & 98	P603	45
A0_AD0		41 & 42		
A1_AD1		39 & 40		
A2_AD2		37 & 38		
A3_AD3		35 & 36		
A4_AD4		33 & 34		
A5_AD5		31 & 32		
A6_AD6		29 & 30		
A7_AD7		27 & 28		
A8_AD8		25 & 26		
A9_AD9		23 & 24		
A10_AD10		21 & 22		
A11_AD11		19 & 20		
A12_AD12		17 & 18		
A13_AD13		15 & 16		
A14_AD14		13 & 14		
A15_AD15		11 & 12		
ALE		43 & 44		
AN_REF	1		P601	6
AN0	3		P603	2
AN1	4		P603	6
AN2	5		P603	1
AN3	6		P603	5
AN4	7		P602	2
AN5	8		P602	4

AN6	9		P602	1
AN7	10		P602	3
AN8	11		P601	2
AN9	12		P601	4
AN10	13		P601	1
AN11	14		P601	3
AN12	15		P603	4
AN13	16		P602	6
AN14	17		P603	3
AN15	18		P602	5
ASC0_RX_TTL	89		P602	30
ASC0_TX_TTL	91		P602	31
ASC1_RX_TTL	93		P602	32
ASC1_RX_TTL_ASC0_DSR	99		P602	35
ASC1_TX_TTL	95		P602	33
ASC1_TX_TTL_ASC0_DTR	97		P602	34
CAN0_RX		61 & 62		
CAN0_TX		63 &64		
CAN1_RX	121		P602	46
CAN1_TX	123		P602	47
CANH0		89 & 90	P603	40
CANL0		91 & 92	P603	41
CNTRL_I2C_SCL		79 & 80	P603	35
CNTRL_I2C_SDA		77 & 78	P603	34
CNTRL_SPI_#CS_NSS		75 & 76	P603	33
CNTRL_SPI_CLK		69 & 70	P603	30
CNTRL_SPI_MRST		71 & 72	P603	31
CNTRL_SPI_MTSR		73 & 74	P603	32
CPU_DACO0_GPIO17	38		P603	7
CPU_DACO1_GPIO19	40		P601	7
EMG_TRAP	114		P601	44
ETH_LNK_LED	111		P602	41
ETH_RX-	109		P602	40
ETH_RX_LED	113		P602	42
ETH_RX+	107		P602	39
ETH_SPD_LED	115		P602	43
ETH_TX-	105		P602	38
ETH_TX+	103		P602	37
EVG0_GPIO40	61		P602	16
EVG1_GPIO42	63		P602	17
EVG2_GPIO44	65		P602	18
EVG3_GPIO46	67		P602	19
EVG4_GPIO48	69		P602	20
EVG5_GPIO50	71		P602	21
EVG6_GPIO52	73		P602	22
EVG7_GPIO54	75		P602	23
EVG8_GPIO56	77		P602	24
EVG9_GPIO57	78		P601	26
EVG10_GPIO58	79		P602	25
EVG11_GPIO59	80		P601	27
EVG12_GPIO60	81		P602	26
EVG13_GPIO61	82		P601	28
EVG14_GPIO62	83		P602	27
EVG15_GPIO63	84		P601	29
EVG16_GPIO64	85		P602	28
EVG17_GPIO65	86		P601	30
EVG18_GPIO66	87		P602	29
EVG19_GPIO67	88		P601	31
EVG20_GPIO69_ASCO_RTS	92		P601	33
EVM0_GPIO21	42		P601	8
EVM1_GPIO23	44		P601	9

EVM2_GPIO41_CAPADC	62		P601	18
EVM3_GPIO43	64		P601	19
EVM4_GPIO45	66		P601	20
EVM5_GPIO47	68		P601	21
EVM6_GPIO49	70		P601	22
EVM7_GPIO51	72		P601	23
EVM8_GPIO53	74		P601	24
EVM9_GPIO55	76		P601	25
EVM10_GPIO68_ASCO_CTS	90		P601	32
GPIO0	21		P603	13
GPIO1	22		P603	15
GPIO2_MCI_DAT0	23		P603	14
GPIO3	24		P603	16
GPIO4_MCI_DAT1	25		P603	17
GPIO5_I2S_TX_WS	26		P603	19
GPIO6_MCI_DAT2	27		P603	18
GPIO7_I2S_RX_CLK	28		P603	20
GPIO8_MCI_DAT3	29		P603	22
GPIO9_I2S_RX_WS	30		P603	21
GPIO10_MCI_CLK	31		P603	23
GPIO11_I2S_RX_SDA	32		P603	24
GPIO12_MCI_CMD	33			
GPIO13_I2S_TX_CLK	34		P603	25
GPIO14_MCI_PWR	35		P603	12
GPIO15_I2S_TX_SDA	36		P603	8
GPIO24_AD7	45		P602	8
GPIO25_AD15	46		P601	10
GPIO26_AD6	47		P602	9
GPIO27_AD14	48		P601	11
GPIO28_AD5	49		P602	10
GPIO29_AD13	50		P601	12
GPIO30_AD4	51		P602	11
GPIO31_ADI2	52		P601	13
GPIO32_AD3	53		P602	12
GPIO33_AD11	54		P601	14
GPIO34_AD2	55		P602	13
GPIO35_AD10	56		P601	15
GPIO36_AD1	57		P602	14
GPIO37_AD9	58		P601	16
GPIO38_AD0	59		P602	15
GPIO39_AD8	60		P601	17
I2C_GEN0_SCL		7 & 8	P603	29
I2C_GEN0_SDA		5 & 6	P603	28
I2C_GEN1_SCL	119		P602	45
I2C_GEN1_SDA	117		P602	44
IRQ_GPIO16_CNTRL_I2C_INT	37		P603	11
IRQ_GPIO18_I2C_GEN0_INT	39		P603	10
IRQ_GPIO20_I2C_GEN1_INT	41		P603	9
IRQ_GPIO22_I2C_INT	43		P602	7
MOTOR_TCO_FB	122		P601	48
MOTORH0_ENC0	116		P601	45
MOTORH1_ENC1	118		P601	46
MOTORH2_ENC2	120		P601	47
MOTORP0H	102		P601	38
MOTORP0L	100		P601	37
MOTORP1H	106		P601	40
MOTORP1L	104		P601	39
MOTORP2H	110		P601	42
MOTORP2L	108		P601	41
MOTORPWM	112		P601	43
SGND	131		P603	46

SGND	132		P603	46
SGND		9 & 10	P603	46
SGND		99 & 100	P603	46
SPI_SSC_#CS_NSS	101		P602	36
SPI_SSC_CLK	98		P601	36
SPI_SSC_MRST_MISO	94		P601	34
SPI_SSC_MTSR_MOSI	96		P601	35
USB_DEBUG_D-		67 & 68		
USB_DEBUG_D+		65 & 66		
USB_DEV_D-		87 & 88	P603	39
USB_DEV_D+		85 & 86	P603	38
USB_HOST_D-		83 & 84	P603	37
USB_HOST_D+		81 & 82	P603	36
VAGND	19		P601	5
VAGND	20		P601	5
Vcc_CM	125		P603	43
Vcc_CM	126		P603	43
Vcc_CM		93 & 94	P603	43

2.5 Mapping Aid



3. Solder Link Options

Many of the options for the adapter/daughter board require a solder bridge to be made or a track bridge to be cut. The adapter board has been designed to be configured in the most popular setting by using track between the options, which will require cutting with a knife before making the alternate connection options.

The options we have are as follows:

VB – Battery Voltage – J204

The mbed module has a VB input which is a battery backup voltage supply. You can connected this to the RS-EDP backup voltage rail or to the standard 3.3V supply via the link option. Note the base boards are supplied by default **without** the battery fitted.

J204 – option 1-2	Connects the VB input to the RS-EDP 3.3V main supply (Default track connection)
J204 – option 2-3	Connects the VB input to the RS-EDP 3.3VBAT supply on the RS-EDP base board.

DIP Pin 5 Option – J205

J205 – option 1-2	DIP Pin 5 is connected to CNTRL_SPIMTSR (Default track connection) Use this option is you want to use it as an SPI function
J205 – option 2-3	DIP Pin5 is connected to EVG10_GPIO58 Use this option is you want to use pin 5 as a general purpose I/O line

DIP Pin 6 Option – J206

J206 – option 1-2	DIP Pin 6 is connected to CNTRL_SPIMRST (Default track connection) Use this option is you want to use it as an SPI function
J206 – option 2-3	DIP Pin6 is connected to EVG9_GPIO57 Use this option is you want to use pin 6 as a general purpose I/O line

DIP Pin 7 Option – J207

J207 – option 1-2	DIP Pin 7 is connected to CNTRL_SPICLK (Default track connection) Use this option is you want to use it as an SPI function
J207 – option 2-3	DIP Pin 7 is connected to EVG8_GPIO56 Use this option is you want to use pin 7 as a general purpose I/O line

DIP Pin 8 Option – J208

This pin has three functions. It primary function is for use as the chip select pin for the CNTRL SPI.

J208 – option 2-4	DIP Pin 8 is connected to #CS_LCD (Default track connection) Use this option is you want to drive an LCD connected to the LCD SPI connector on the RS-EDP-CM-mbed adapter board.
J208 – option 2-1	DIP Pin 8 is connected to CNTRL_SPI_#CD_NSS. Use this option is you want to use pin 8 as a general purpose chip select line for the CNTRL SPI. This signal is for possible use by application modules within the RS-EDP system that want to make use

	of the CNTRL SPI bus.
J208 – option 2-3	DIP Pin 8 is connected to EVG7_GPIO54 Use this option if you want to use pin 8 as a general purpose I/O line

DIP Pin 11 Option – J209

J209 – option 1-2	DIP Pin 11 is connected to GPIO12_MCICMD(Default track connection) Use this option if you want to use it as an SPI function to talk to the SD Card on the daughter board.
J209 – option 2-3	DIP Pin 11 is connected to EVM2_GPIO41_CAPADC Use this option is you want to use pin 11 as a general purpose I/O line

DIP Pin 12 Option – J210

J210 – option 1-2	DIP Pin 12 is connected to GPIO2_MCIDAT0(Default track connection) Use this option if you want to use it as an SPI function to talk to the SD Card on the daughter board.
J210 – option 2-3	DIP Pin 12 is connected to EVM3_GPIO43 Use this option is you want to use pin 12 as a general purpose I/O line

DIP Pin 13 Option – J211

J211 – option 1-2	DIP Pin 13 is connected to GPIO10_MCICLK (Default track connection) Use this option if you want to use it as an SPI function to talk to the SD Card on the daughter board.
J211 – option 2-3	DIP Pin 13 is connected to ASC1_TX_TTL Use this option if you want to use pin 13 as a ASC1/UART1 serial Tx channel.

DIP Pin 14 Option – J212

J212 – option 2-1	DIP Pin 14 is connected to GPIO8_MCIDAT3 Use this option is you want to use it as an SPI function to talk to the SD Card on the daughter board.
J212 – option 2-4	DIP Pin 14 is connected to #CS_SD (Default track connection) Use this option if you want to use pin 14 as a chip select for the SD card.
J212 – option 2-3	DIP Pin 14 is connected to ASC1_RX_TTL. Use this option is you want to use pin 14 as a ASC1/UART1 serial Rx channel.

DIP Pin 15 Option - J213

J213 – option 1-2	DIP Pin 15 is connected to AN0. (Default track connection) Use this option if you want to use it as an analogue input.
J213 – option 2-3	DIP Pin 15 is connected to EVM0_GPIO21 Use this option if you want to use pin 15 as a general I/O pin.

DIP Pin 16 Option – J214

J214 – option 2-1	DIP Pin 16 is connected to AN1. Use this option if you want to use it as an analogue input on backplane signal AN1.
J214 – option 2-4	DIP Pin 16 is connected to AN10 (Default track connection) Use this option if you want to use it as an analogue input on backplane signal AN10.
J214 – option 2-3	DIP Pin 16 is connected to EVM1_GPIO23. Use this option if you want to use pin 16 as a general purpose I/O.

DIP Pin 17 Option - J215

J215 – option 1-2	DIP Pin 17 is connected to AN2. (Default track connection) Use this option if you want to use it as an analogue input.
J215 – option 2-3	DIP Pin 17 is connected to IRQ_GPIO16_CNTRL_I2CIN. Use this option if you want to use pin 17 as a GPIO.

DIP Pin 18 Option – J216

J216 – option 2-1	DIP Pin 18 is connected to AN3. Use this option if you want to use it as an analogue input.
J216 – option 2-4	DIP Pin 18 is connected to AN12 (Default track connection) Use this option if you want to use it as an analogue input.
J216 – option 2-3	DIP Pin 18 is connected to CPU_DACO0_GPIO17. Use this option if you want to use pin 18 as a DAC output or GPIO

DIP Pin 19 Option - J217

J217 – option 1-2	DIP Pin 19 is connected to AN4. (Default track connection) Use this option if you want to use it as an analogue input.
J217 – option 2-3	DIP Pin 19 is connected to GPIO0. Use this option if you want to use pin 19 as a GPIO.

DIP Pin 20 Option - J218

J218 – option 1-2	DIP Pin 20 is connected to AN5. (Default track connection) Use this option if you want to use it as an analogue input.
J218 – option 2-3	DIP Pin 20 is connected to ASC1_RX_TTL_ASCODSR Use this option if you want to use pin 20 as a GPIO pin. (Note this pin is used as a chip select on the communications module for RS422 function enable.) Do not confuse this pin with ASC1_RX_TTL as this is a different pin on the base board.

DIP Pin 21 Option - J219

J219 – option 1-2	DIP Pin 21 is connected to CPU_DACO0_GPIO17. (Default track connection) Use this function if you want to use this pin for PWM output and for the signal to appear on this bus connection.
J219 – option 2-3	DIP Pin 21 is connected to MOTOR_P0L. Alternate selection for PWM output.

DIP Pin 22 Option - J220

J220 – option 1-2	DIP Pin 22 is connected to CPU_DACO1_GPIO19. (Default track connection) Use this function if you want to use this pin for PWM output and for the signal to appear on this bus connection.
J220 – option 2-3	DIP Pin 22 is connected to MOTOR_P1L. Alternate selection for PWM output.

DIP Pin 23 Option - J221

J221 – option 1-2	DIP Pin 23 is connected to EVG0_GPIO40. (Default track connection) Use this function if you want to use this pin for PWM output.
J221 – option 2-3	DIP Pin 23 is connected to MOTOR_P2L. Alternate selection for PWM output.

DIP Pin 24 Option - J222

J222 – option 1-2	DIP Pin 24 is connected to EVG1_GPIO42. (Default track connection) Use this function if you want to use this pin for PWM output.
J222 – option 2-3	DIP Pin 24 is connected to MOTOR_P0H. Alternate selection for PWM output.

DIP Pin 25 Option - J223

J223 – option 2-1	DIP Pin 25 is connected to EVG2_GPIO44. Use this function if you want to use this pin for PWM output.
J223 – option 2-3	DIP Pin 25 is connected to ASC1_RX_TTL. (Default track connection) Use this option if you want to use ASC1 for serial communications.
J223 – option 2-4	DIP Pin 25 is connected to MOTOR_P1H. Alternate selection for PWM output.

DIP Pin 26 Option - J224

J224 – option 2-1	DIP Pin 26 is connected to EVG3_GPIO46. Use this function if you want to use this pin for PWM output.
J224 – option 2-3	DIP Pin 26 is connected to ASC1_TX_TTL. (Default track connection) Use this option if you want to use ASC1 for serial communications.
J224 – option 2-4	DIP Pin 26 is connected to MOTOR_P2H. Alternate selection for PWM output.

DIP Pin 27 Option - J225

J225 – option 1-2	DIP Pin 27 is connected to ASC0_RX_TTL. (Default track connection) Use this option if you want to use ASC0 for serial communications.
J225 – option 2-3	DIP Pin 27 is connected to EVG4_GPIO48. Use this option if you want to use pin 27 as a general purpose I/O.

DIP Pin 28 Option - J226

J226 – option 1-2	DIP Pin 28 is connected to ASC0_TX_TTL. (Default track connection) Use this option if you want to use ASC0 for serial communications.
J226 – option 2-3	DIP Pin 28 is connected to EVG5_GPIO50. Use this option if you want to use pin 28 as a general purpose I/O.

DIP Pin 29 Option - J227

J227 – option 1-2	DIP Pin 29 is connected to EVM7_GPIO47. (Default track connection) Use this option if you want to use pin 29 as a general purpose I/O.
J227 – option 2-3	DIP Pin 28 is connected to CAN0_TX. Use this option if you want to use pin 29 for CAN purposes .

DIP Pin 30 Option - J228

J228 – option 1-2	DIP Pin 30 is connected to EVG6_GPIO52. (Default track connection) Use this option if you want to use pin 30 as a general purpose I/O.
J228 – option 2-3	DIP Pin 30 is connected to CAN0_RX. Use this option if you want to use pin 30 for CAN purposes .

4. Zero Ohm Links

Vcc_CM - Command Module Voltage – R101
R101 is used to connect the 3.3V rail to the Vcc_CM rail. This Vcc_CM rail is the command module voltage operating voltage rail. There is only one mbed module at present and it is based on an NXP 3.3V operation MCU. If however a 5V module appears then this link can be removed and replaced with a wire link to connect the 5V to the Vcc_CM. Under normal circumstance this resistor should remain fitted and it is the default options.

R101 – option – populated	The Vcc_CM line is connected to 3.3V (DEFAULT)

VAGND - Analogue Ground – R102
The VAGND and SGND lines are connected on the adapter module via the zero ohm link R102. For different grounding arrangement this resistor may be removed. The main user manual for the RS-EDP unit explains in more details about the ground options. The analogue module for example can have its analogue ground line connected to SGND also or instead of at this point.

R102 – option – populated	The VAGND and SGND lines are connected on the adapter board (DEFAULT)

12VGND – 12V Power Ground – R103
The 12VGND and SGND lines are connected on the adapter module via this zero ohm link R103. The default setting is to have this removed. See the circuit diagram for the base board module to see how the grounding scheme for the 12V works.

R103 – option - populated	The 12VGND and the SGND are connected on the adapter board
R103 – option – not populated	The 12VGND and the SGND are not connected on the adapter board. (DEFAULT)

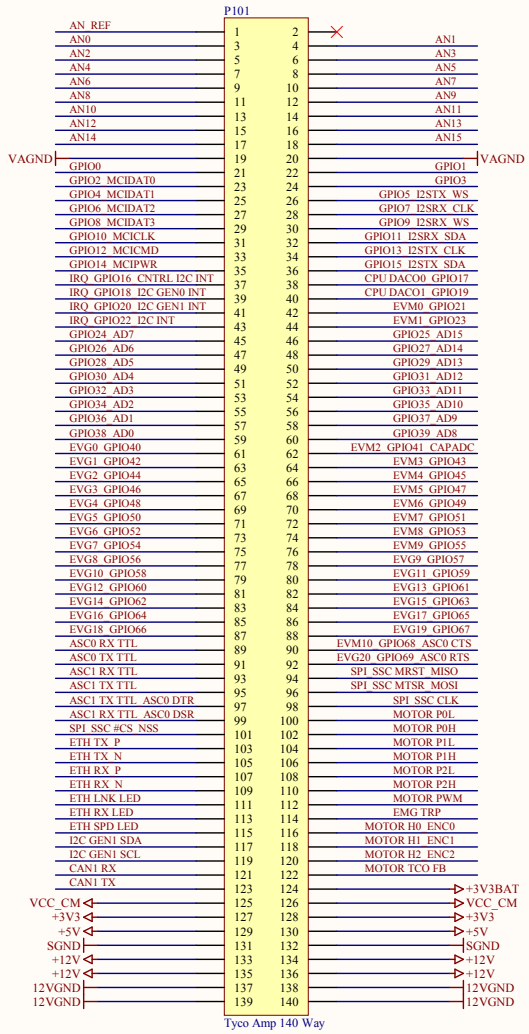
5. Software Support

The mbed Command Module for the RS-EDP platform is supported by all of the necessary software drivers to make driving of the platform very easy. All the low level support for the devices controlled by I2C for example have been written, as well as a test menu to exercise each of the modules independently of the others. This therefore provides working example of the code which will allow students and users to cut and paste various sections into their own applications.

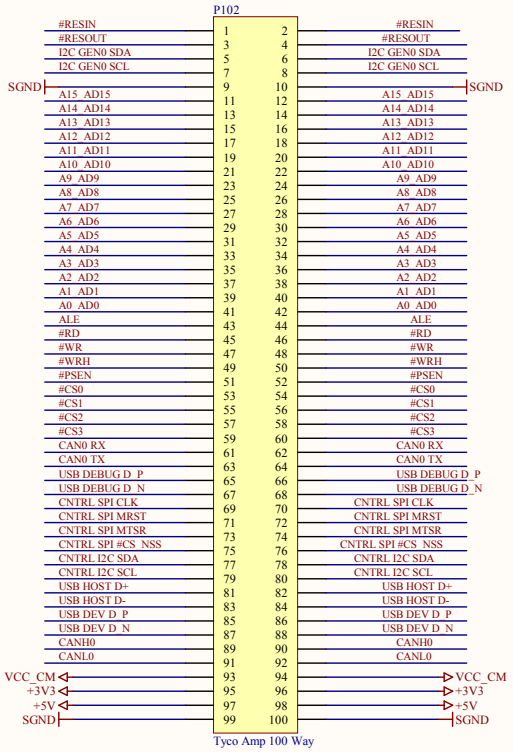
Each applications module has its own header file which provides the support for the functions that control it. Each module has its own set of high level functions that can be called to operate and control the hardware. This makes life a lot easier for the user, who can then spend most of his time working at the higher level application layer.

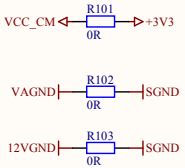
The software has been packed up as a single ZIP file which can be imported into the mbed development environment by use of the ‘Project- Import’ feature.

EDPCON1 IO Connector

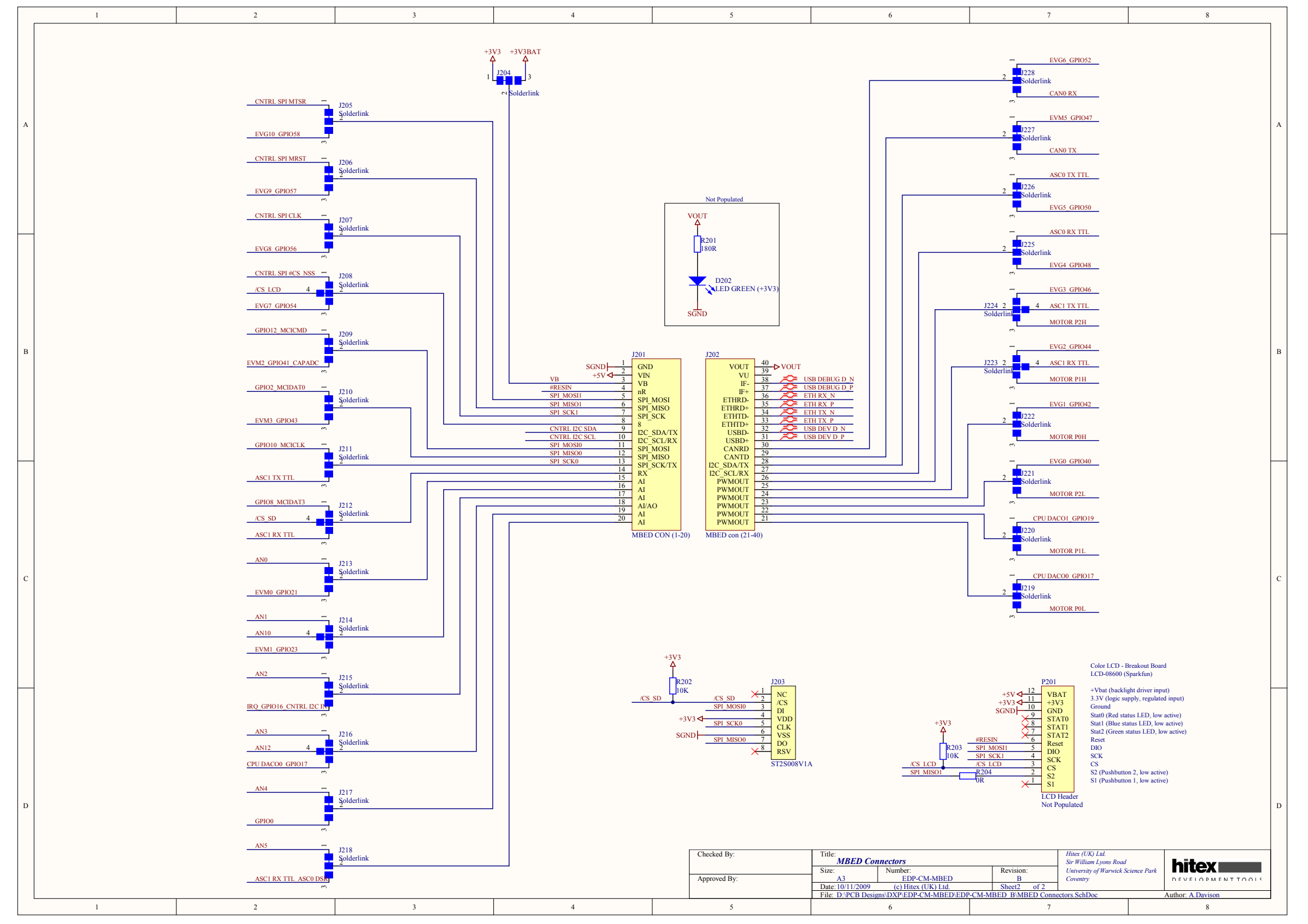


EDPCON2 Bus/Control Connector





Checked By:	Title: ***EDP Connectors***		*Hitex (UK) Ltd.* *Sir William Lyons Road* *University of Warwick Science Park* *Coventry*
Approved By:	Size: A3	Number: EDP-CM-MBED	Revision: B
	Date: 10/11/2009	(c) Hitex (UK) Ltd.	Sheet1 of 2
	File: D:\PCB Designs\DXP\EDP-CM-MBED\EDP-CM-MBED_B\Module Connectors.SchDoc		Author: A.Davison


+3V3
+3V3BAT
J204
Solderlink
CNTRL SPI MTSR
J205
Solderlink
EVG10_GPIO58
CNTRL SPI MRST
J206
Solderlink
EVG9_GPIO57
CNTRL SPI CLK
J207
Solderlink
EVG8_GPIO56
CNTRL SPI #CS_NSS
/CS_LCD
J208
Solderlink
EVG7_GPIO54
GPIO12_MCICMD
J209
Solderlink
EVM2_GPIO41_CAPADC
GPIO2_MCIDAT0
J210
Solderlink
EVM3_GPIO43
GPIO10_MCICLK
J211
Solderlink
ASC1 TX TTL
GPIO8_MCIDAT3
/CS_SD
J212
Solderlink
ASC1 RX TTL
AN0
J213
Solderlink
EVM0_GPIO21
AN1
AN10
J214
Solderlink
EVM1_GPIO23
AN2
J215
Solderlink
IRQ_GPIO16_CNTRL I2C IN
AN3
AN12
J216
Solderlink
CPU DACO0_GPIO17
AN4
J217
Solderlink
GPIO0
AN5
J218
Solderlink
ASC1 RX TTL_ASC0 DSR
Not Populated
VOUT
R201
180R
D202
LED GREEN (+3V3)
SGND
J201
GND
VIN
VB
nR
SPI_MOSI
SPI_MISO
SPI_SCK
8
I2C_SDA/TX
I2C_SCL/RX
SPI_MOSI
SPI_MISO
SPI_SCK/TX
RX
AI
AI
AI
AI/AO
AI
AI
SGND
+5V
VB
#RESIN
SPI_MOSI1
SPI_MISO1
SPI_SCK1
CNTRL I2C SDA
CNTRL I2C SCL
SPI_MOSI0
SPI_MISO0
SPI_SCK0
MBED CON (1-20)
J202
VOUT
VU
IF-
IF+
ETHRD-
ETHRD+
ETHTD-
ETHTD+
USBD-
USBD+
CANRD
CANTD
I2C_SDA/TX
I2C_SCL/RX
PWMOUT
PWMOUT
PWMOUT
PWMOUT
PWMOUT
PWMOUT
PWMOUT
VOUT
USB DEBUG D_N
USB DEBUG D_P
ETH RX_N
ETH RX_P
ETH TX_N
ETH TX_P
USB DEV D_N
USB DEV D_P
MBED con (21-40)
EVG6_GPIO52
J228
Solderlink
CAN0 RX
EVM5_GPIO47
J227
Solderlink
CAN0 TX
ASC0 TX TTL
J226
Solderlink
EVG5_GPIO50
ASC0 RX TTL
J225
Solderlink
EVG4_GPIO48
EVG3_GPIO46
J224
Solderlink
ASC1 TX TTL
MOTOR P2H
EVG2_GPIO44
J223
Solderlink
ASC1 RX TTL
MOTOR P1H
EVG1_GPIO42
J222
Solderlink
MOTOR P0H
EVG0_GPIO40
J221
Solderlink
MOTOR P2L
CPU DACO1_GPIO19
J220
Solderlink
MOTOR P1L
CPU DACO0_GPIO17
J219
Solderlink
MOTOR P0L
+3V3
R202
10K
/CS_SD
J203
NC
/CS
DI
VDD
CLK
VSS
DO
RSV
SPI_MOSI0
SPI_SCK0
SPI_MISO0
ST2S008V1A
+3V3
R203
10K
/CS_LCD
SPI_MISO1
R204
0R
P201
VBAT
+3V3
GND
STAT0
STAT1
STAT2
Reset
DIO
SCK
CS
S2
S1
#RESIN
SPI_MOSI1
SPI_SCK1
/CS_LCD
LCD Header
Not Populated
Color LCD - Breakout Board
LCD-08600 (Sparkfun)
+Vbat (backlight driver input)
3.3V (logic supply, regulated input)
Ground
Stat0 (Red status LED, low active)
Stat1 (Blue status LED, low active)
Stat2 (Green status LED, low active)
Reset
DIO
SCK
CS
S2 (Pushbutton 2, low active)
S1 (Pushbutton 1, low active)
Checked By:
Approved By:
Title:
MBED Connectors
Size: A3
Number: EDP-CM-MBED
Revision: B
Date: 10/11/2009
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Sheet2 of 2
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University of Warwick Science Park
Coventry
Author: A.Davison
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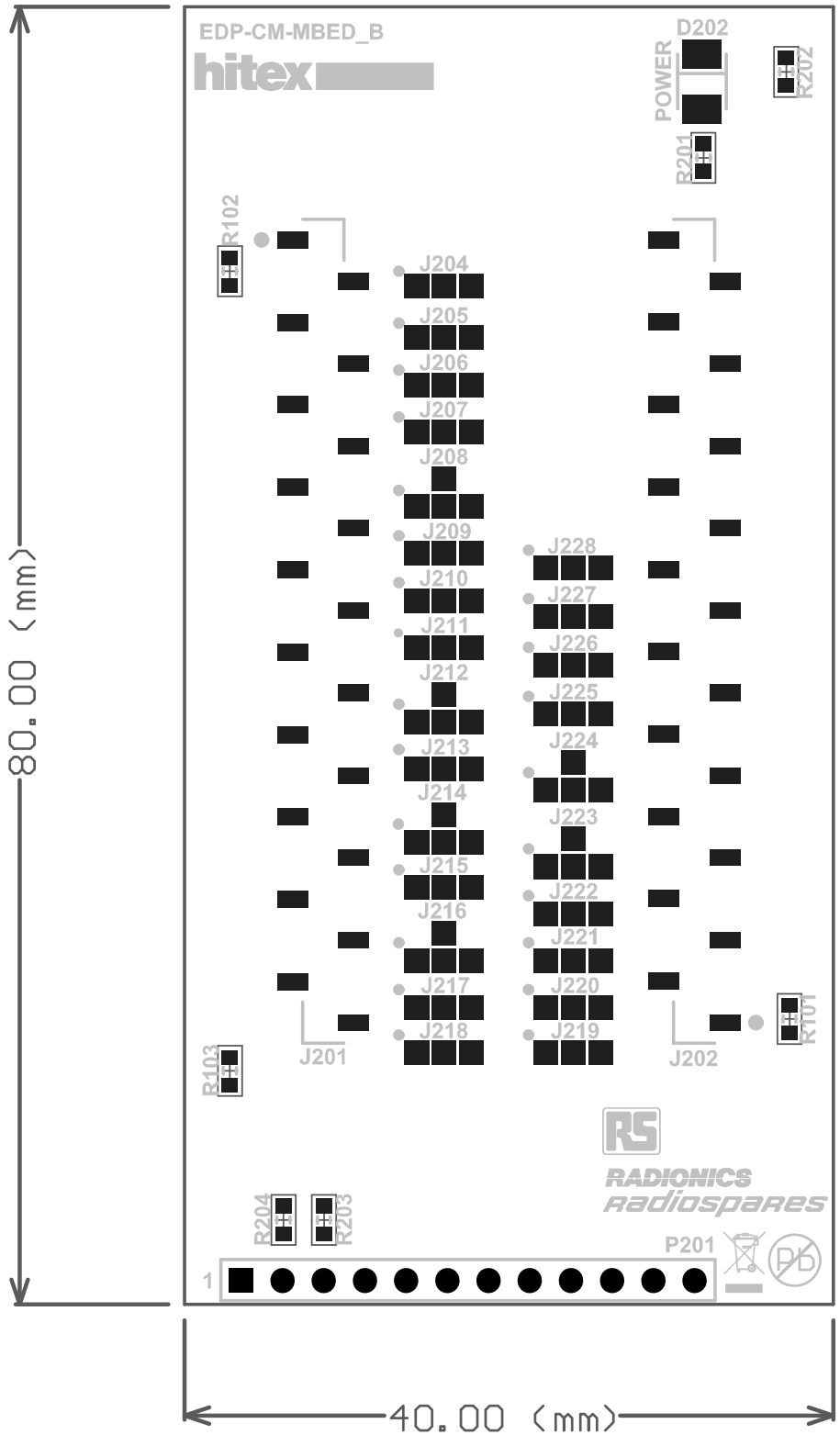
DEVELOPMENT TOOLS


EDP-CM-MBED_B
hitex
D202
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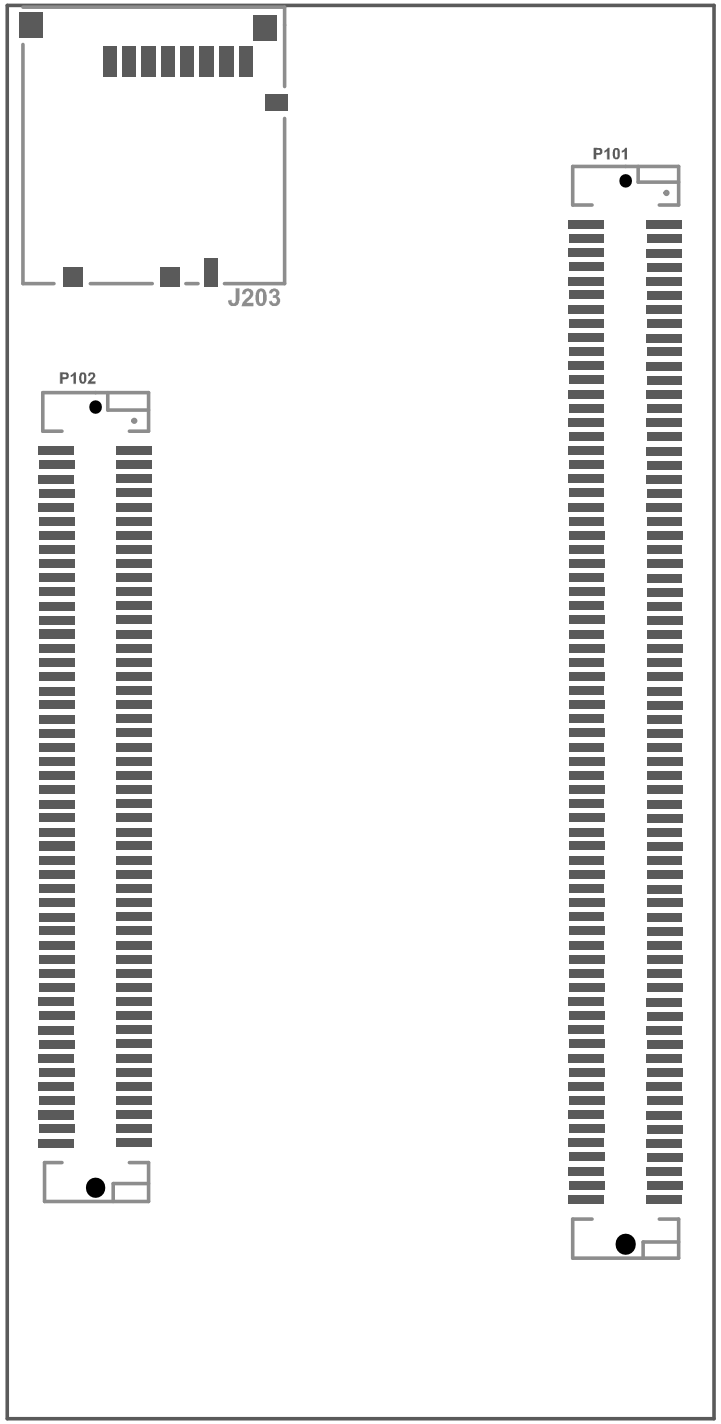
40.00 (mm)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P101
P102