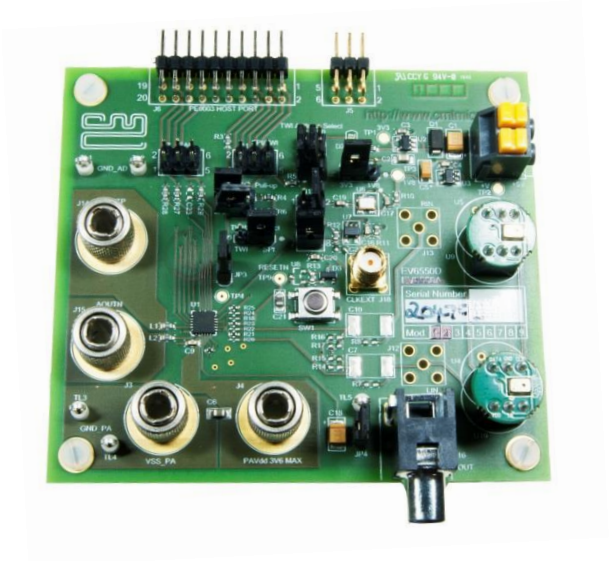
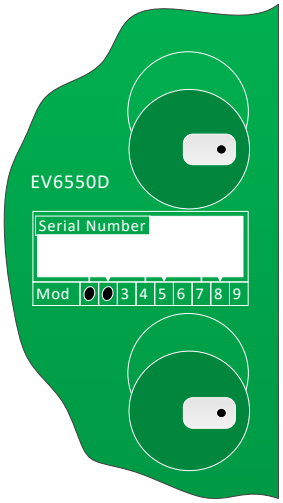
EV6550D
Evaluation Kit for CMX655D

UM6550/4 October 2019 **USER MANUAL** Provisional

Features

- **EV6550D**
  - **Demonstrates the CMX655D**
  - **Sockets to support Digital MEMS microphone evaluation boards**
- **Direct Class-D connections for full evaluation of Class-D**
- **On board 24.576MHz clock**
- **On-board supply regulators operate from a single 5 volt supply**
- **Host Port allows for quick setup with PE0003**
- **Optional pull-ups and address selection for TWI**





1 Brief Description

The EV6550D Evaluation Kit is designed to assist in the evaluation and application development of the CMX655D. The kit is in the form of a populated PCB comprising a CMX655D IC and appropriate supporting components and circuitry.

With the class-D disabled, the board runs from a single +5V supply sourced from the PE0003 or bench power supply. The board allows for the CMX655D to be run at 3.3V or 1.8V via jumper configuration. If the class-D is enabled an additional supply is required, this is connected directly to the CMX655D. The CMX655D supply must be set to 3.3V if the class-D is enabled.

The board is fitted with a Host port connector allowing the EV6550D to be operated by connection to the Host port on a CML PE0003 Universal Interface Card, and used with the associated PC GUI software, or by direct connection between the CMX655D SPI (Serial Peripheral Interface) or TWI (Two Wire Interface) and the user's µC development application or emulation system.

The EV6550D is designed to interface with MEMS (Micro-ElectroMechanical System) microphone evaluation boards. These boards are shipped and fitted with the Evaluation Kits. However should they be removed during testing it is important that, when refitted, they are correctly orientated with the aperture on the microphone aligned to the right (see diagram above).

CONTENTS

It is recommended that you check for the latest product datasheet version from the Products page of the CML website: www.cmlmicro.com.

This is Advance Information; changes and additions may be made to this document. Parameters marked TBA or left blank will be included in later issues of this document.

History

Version	Changes	Date
4	All references to EV6550A removed. Updated MEMS microphone module from STEVAL-MKI155V3 to STEVAL-MIC001V1	28th October 2019
3	Section 7.3 – Software Description: New Figures 5 to 10 and Figure 12 (updated screen shots to show new GUI features). Section 7.3 – Software Description: Paragraph describing 'save state' and 'load state' no longer greyed out as this function is now implemented in the GUI. Section 7.3.5 – added text to state that stereo .wav files are now supported.	6th March 2019
2	Front page – photograph of Rev B board and diagram showing correct MEMS microphone orientation New Figure 3 and Figure 4 showing revised PCB layout	20th December 2018
1	First release	19th October 2018

2 Block Diagram

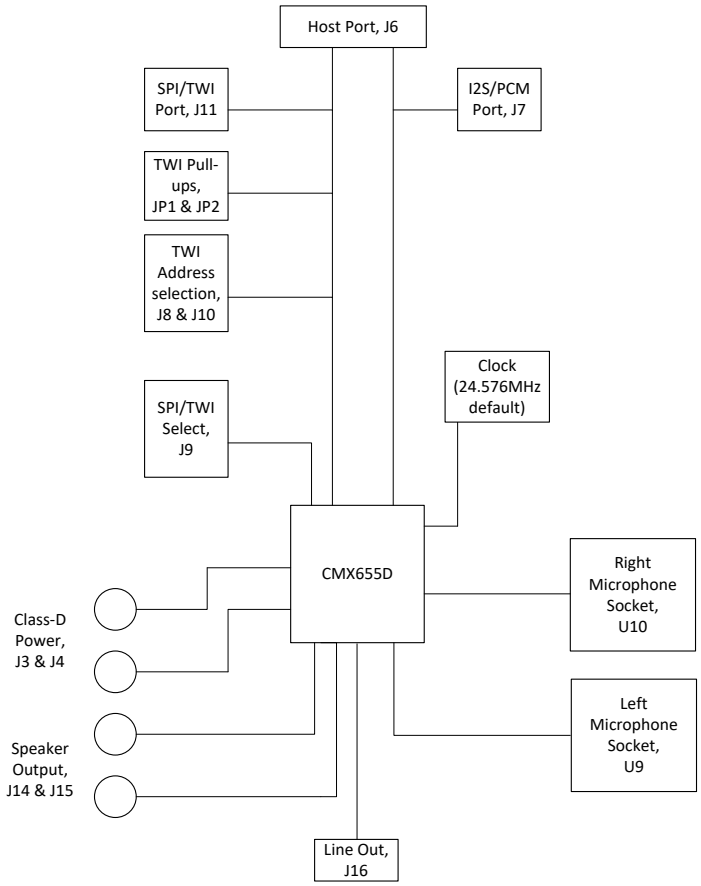


Figure 1 EV Kit Block Diagram

3 Preliminary Information

3.1 Laboratory Equipment

The following items are required for evaluation of the EV6550D:

- MEMS microphone evaluation board (STEVAL-MIC001V1 included with this kit)
- PE0003 or other host µC with SPI/TWI and I^2S/PCM ports
- 4Ω - 8Ω speaker or equivalent load

3.1.1 Power Supply

The evaluation kit requires a single +5V rail. This can be supplied from the PE0003 or directly from a bench power supply. If the class-D is enabled an additional supply of 3.3V is required. This is connected directly to the CMX655D with no overvoltage protection. The current requirement of this supply depends on the impedance of the speaker connected to the CMX655D.

3.2 Handling Precautions

This product is designed for use in office and laboratory environments. The following practices will help ensure its proper operation.

3.2.1 SSD Devices

This product uses low-power CMOS circuits that can be damaged by electrostatic discharge. Partially-damaged circuits can function erroneously, leading to misleading results. Observe ESD precautions at all times when handling this product.

3.2.2 Contents - Unpacking

Please ensure that you have received all of the items on the separate information sheet (EK6550) and notify CML within seven working days if the delivery is incomplete.

3.3 Approvals

This product is not approved to any EMC or other regulatory standard. Users are advised to observe local statutory requirements, which may apply to this product and the radio frequency signals that may emanate from it.

4 Quick Start

This section provides instructions for users who wish to experiment immediately with this Evaluation Kit. A more complete description of the kit and its uses appears later in this document. The user should also read the appropriate datasheet before using the board.

4.1 Setting-Up

Refer to the PE0003 user manual and follow the instructions given in the quick start section. The basic arrangement, when used with the PE0003, is shown below:

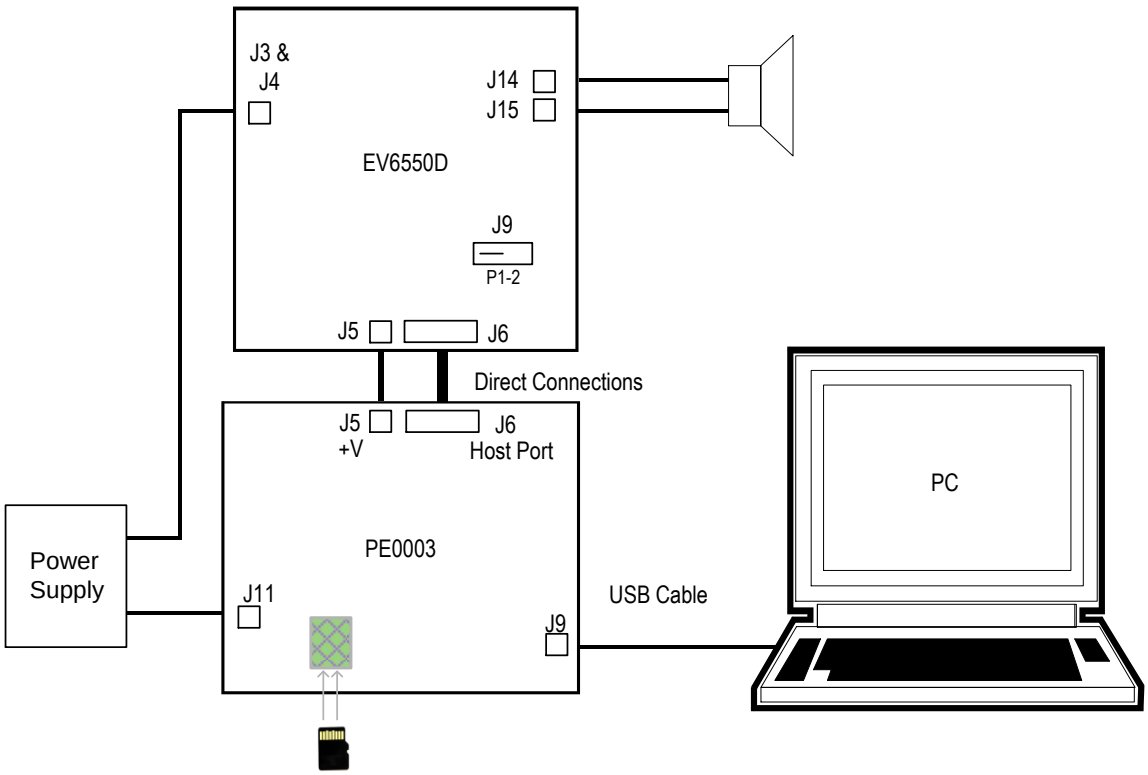


Figure 2 Typical Evaluation Connections for EV6550D

4.2 Operation

CMX655D device set-up, monitoring and data transfer is via the Host Port connection and can be achieved with the ES6550 GUI application.

J9 should be set to SPI mode p1->2, when using the PE0003, see Table 4.

Note: from power up, or after reset, the internal system clock of the CMX655D is disabled. A large portion of the CMX655D controls are disabled with the clock off. To enable the clock from the 'SPI Control' tab (Figure 5) the 'Clock Start' button should be clicked. This will issue a clock start command and wait for the clock ready bit. If successful, the 'Clock Ready' status indicator will go green.

5 Signal Lists

Table 1 Connector List

CONNECTOR PINOUT				
Connector Ref.	**Connector Pin No.**	**Signal Name**	**Signal Type**	**Description**
J1	1	0V	PWR	External supply ground
J1	2	+V	PWR	External supply nominally +5V
J3	1	VSS_PA	PWR	External class-D supply ground
J4	1	PAVdd	PWR	External class-D supply nominally 3V3
J5	1,2	GND_AD	PWR	Low power supply ground
J5	3 to 6	+V	PWR	External supply from PE0003
J6	1	IRQN	O/P	Interrupt request output. Connects to host microcontroller
J6	2	MISO	O/P	SPI master in data. Connects to host microcontroller
J6	3	MOSI	I/P	SPI master out data. Connects to host microcontroller
J6	4	CSN	I/P	SPI chip select. Connects to host microcontroller
J6	5	SCLK	I/P	SPI Clock. Connects to host microcontroller
J6	6	RESETN	I/P	Active low reset line
J6	7, 8	GND_AD	PWR	Low power ground
J6	9 to 12	N/C		
J6	13,14	BCLK	I/P or O/P	Serial audio interface clock
J6	15,16	LRCLK	I/P or O/P	Serial audio interface LRCLK
J6	17	SDO	O/P	Serial audio interface data out
J6	18	SDI	I/P	Serial audio interface data in
J6	19, 20	GND_AD	PWR	Low power ground
J7	1	SDI	I/P	Serial audio interface data in
J7	2	SDO	O/P	Serial audio interface data out
J7	3	LRCLK/FS	I/P or O/P	Serial audio interface LRCLK or frame sync
J7	4	BCLK	I/P or O/P	Serial audio interface clock
J7	5,6	GND_AD	PWR	Low power ground
J11	1	SCLK/SCL	I/P	Control interface clock
J11	2	CSN/A0	I/P	Control interface chip select or address bit 0
J11	3	MOSI/A1	I/P	Control interface master out data or address bit 1
J11	4	MISO/SDA	O/P or Bi	Control interface master in data or TWI data
J11	5,6	GND_AD	PWR	Low power ground
J14	1	AOUTP	O/P	Speaker +ve connection
J15	1	AOUTN	O/P	Speaker -ve connection
J16	1	LOUT	O/P	Line out signal
J18	1	CLKEXT	I/P	External clock input

U9	1	MICDI	I/P	Data from digital MEMS microphone
U9	2	GND_AD	PWR	Ground for digital MEMS microphone
U9	3	MICCLK	O/P	Clock for digital MEMS microphone
U9	4	N/C		
U9	5	LR1	O/P	LR pin for digital MEMS microphone held at 1
U9	6	VDD_AD	PWR	Supply for digital MEMS microphone
U10	1	MICDI	I/P	Data from digital MEMS microphone
U10	2	GND_AD	PWR	Ground for digital MEMS microphone
U10	3	MICCLK	O/P	Clock for digital MEMS microphone
U10	4	N/C		
U10	5	LR0	O/P	LR pin for digital MEMS microphone held at 0
U10	6	VDD_AD	PWR	Supply for digital MEMS microphone

Table 2 Test Points

TEST POINTS		
Test Point Ref.	**Default Measurement**	**Description**
TP1	3.3V	Output of 3.3 V on board regulator
TP2	+V	Unregulated board supply
TP3	1.8	Output of 1.8V on board regulator
TP4	3.3V	Low power supply rail
TP5	1.2V	VDD_A pin
TP6	1.2V	BIAS pin
TP7	-	Not connected
TP8	3.3V	VDD_AD
TP9	3.3V	Active low reset signal

Table 3 Test Loops

TEST LOOPS		
Test Point Ref.	**Default Measurement**	**Description**
TL1	0V	Low power supply ground
TL2	0V	Low power supply ground
TL3	0V	Class-D power supply ground
TL4	0V	Class-D power supply ground
TL5	0V	Line out signal

Table 4 Jumpers

JUMPERS		
Ref.	**Default Setting**	**Description**
J2	2-3	VDD select. 1-2 for 1V8, 2-3 for 3V3
J8	open	TWI address 0 select. 1-2 for high, 2-3 for low
J9	1-2	Interface select. 1-2 for SPI, 2-3 for TWI
J10	open	TWI address 1 select. 1-2 for high, 2-3 for low
J17	-	See Table 5
JP1	open	Optional pull-up for TWI SCL
JP2	open	Optional pull-up for TWI SDA
JP3	1-2	Isolates low power supply if removed
JP4	open	DC couples LOUT signal if inserted

Notes:
I/P = Input
O/P = Output
TL = Test Loop
TP = Test Point

6 Circuit Schematics and Board Layouts

For clarity, the circuit schematic diagrams are available as separate high-resolution files, which can be downloaded from the CML website. The layout on each side of the PCB is shown in Figure 3 and Figure 4.

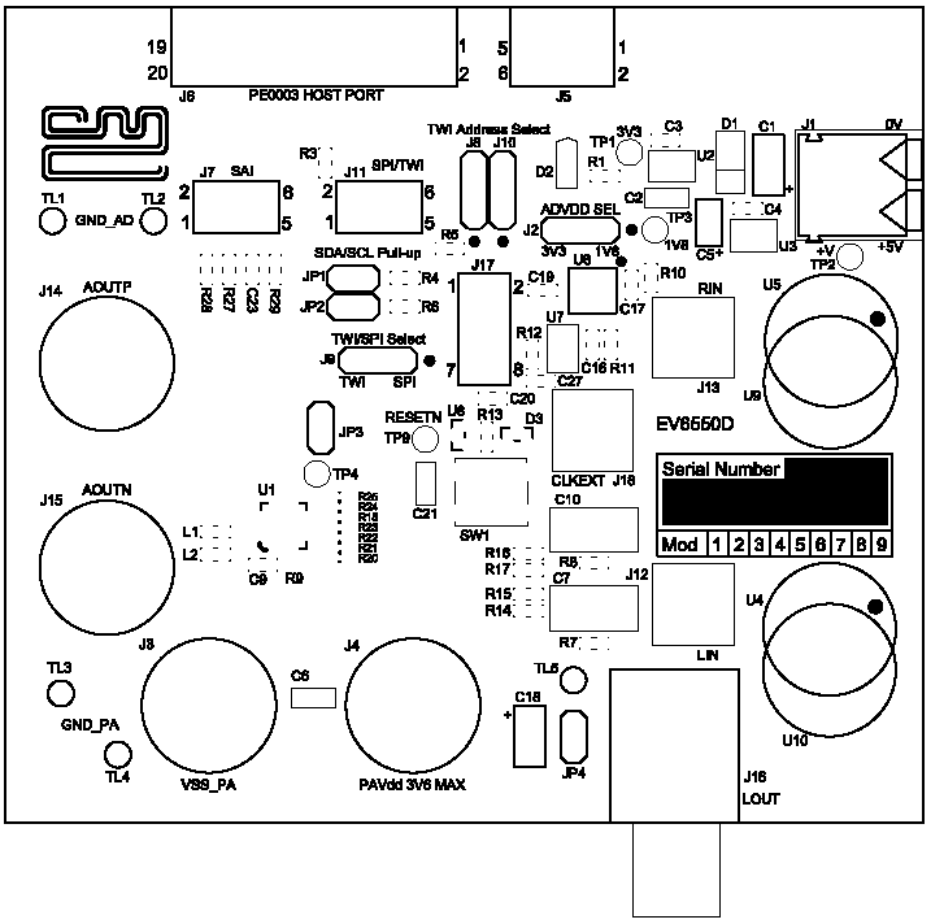


Figure 3 PCB Layout: Top

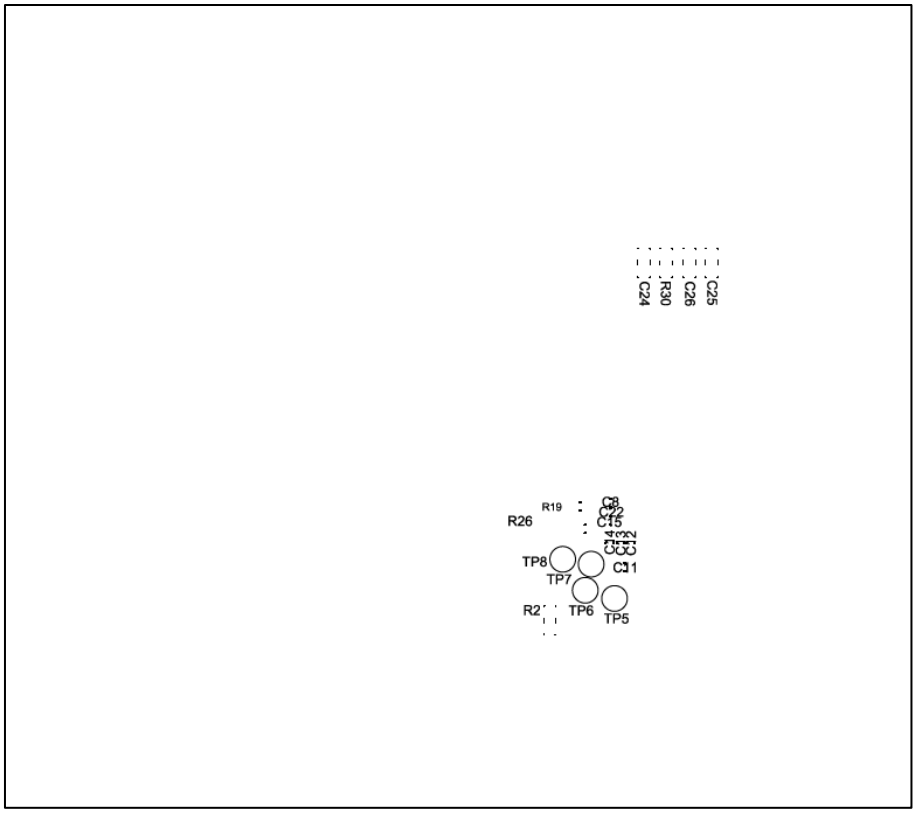


Figure 4 PCB Layout: Bottom

7 Detailed Description

The EV6550D functionality includes:

- Optional pull-ups and selection jumpers for flexible use of either SPI or TWI for the control interface.
- Two on-board regulators to allow for evaluation of the CMX655D with a 3.3V or 1.8V power rail.
- Direct connections for class-D supplies and outputs. This allows full evaluation of the class-D including signal quality and efficiency.
- Two dual-in-line sockets to support evaluation with STEVAL-MIC001V1 or similar boards.

7.1 Hardware Description

7.1.1 Power Supplies

All on-board power rails are derived from an external +5V supply. Each power rail has a test point where it can be monitored, see Table 2.

7.1.2 Clock Options

The PCB design provides one on board clock source of 24.576MHz. The CMX655D is designed to operate with a clock of this frequency. The CMX655D has a PLL to generate 24.576MHz if this frequency is not available therefore the PCB is designed to support an external clock via J18. The 24.576MHz clock operates at 1.8V therefore when operating the CMX655D at 3.3V the external buffer is required.

When using the CMX655D internal clock source (low power oscillator) it is recommended to stop the RCLK pin from oscillating, see Disable RCLK clock option.

Header J17 is used with jumper sockets to select the required option as shown in Table 5:

Table 5 Clock Select Jumper Positions

Clock Select Jumper Positions	
Clock Option	**Fit J17 jumpers on pins:**
24.576MHz, Buffered	2-4, 7-8
External, Buffered	4-6, 7-8
Disable RCLK	3-4,7-8

7.1.3 Host Port

The host port, on J6, carries the control interface and serial audio interface lines. The control interface should be in the SPI format and the serial audio interface should be in the I^2S format to conform the host port standard. This port allows one connection to a PE0003 to control the CMX655D and transfer data.

7.1.4 Control Port

The same control interface signals as on the host port are available via J11.

J9 is connected to the SPIS pin of the CMX655D and allows the mode of the control interface to be selected. 1-2 will hold the SPIS pin high and put the control port in SPI mode. 2-3 will hold the SPIS pin low and put the control port in TWI mode.

The TWI is normally driven via open drain pins and requires pull ups. The EV6550D allows the clock and data lines to be pulled up with a 1.8kΩ resistor via JP1 and JP2. In TWI mode MOSI/A1 and CSN/A0 become address lines for ease of use these lines can be controlled via J8 and J10.

Table 6 TWI Address Jumper Positions

TWI Address Jumper Positions			
J8 Positon	**J10 Positon**	**A0 & A1**	**TWI Address**
2-3	2-3	00	0x54
2-3	1-2	01	0x55
1-2	2-3	10	0x56
1-2	1-2	11	0x57

7.1.5 Serial Audio Port

The same serial audio interface signals as on the host port are available via J7.

7.1.6 Microphone Interface

U9 and U10 are designed to interface with MEMS microphone evaluation boards. The EV6550D is designed for the STEVAL-MIC001V1 (supplied with this kit). The pin positions are the same as a 6-pin IC DIL device so other boards may be compatible.

The EV6550D directly connects both microphones to the MICCLK and MICDI pins. The LR pin is held in different states for each microphone such that U9 is left and U10 is right.

7.1.7 Class-D

The EV6550D class-D connections are directly connected to the CMX655D with no overvoltage protection. This is to allow for efficiency measurements to be conducted by measuring power in and out of the PCB. As the Class-D output signal contains high frequency components by design it is suggested to use a ~22kHz RC filter when observing the output on an oscilloscope. L1 and L2 are fitted with 0Ω links but can be replaced with ferrite beads. The maximum voltage for the class-D is 3.6V to safely achieve this, an external voltage of 3.6V should be applied to J2 P2 and this will increase the voltage of the low power rail on the CMX655D. The tracks for the class-D have be designed to produce minimal resistance at maximum output power.

7.2 Adjustments and Controls

7.2.1 VDD_AD selection

J2 allows for VDD_AD to operate at 3.3V or 1.8V. All the logic on the EV6550D with the exception of the clock module operates at the voltage selected by this jumper. A clock buffer allows for the 1.8V clock module to operate the 3.3V RCLK pin of the CMX655, for this reason the clock buffer should be used if operating at 3.3V. When operating at 1.8V the clock buffer is optional.

7.3 Software Description

The EV6550D itself does not require any embedded firmware. However, it does require serial control from an external microcontroller. The CML PE0003 Universal Interface Card can be used with the EV6550D and PC software files in '**`ES6550xx.zip`**'. To use the software, connect the EV6550D and PE0003 as shown in Figure 2. First ensure that the drivers supplied for the PE0003 are installed correctly and are the latest versions. The executable file must be in the same folder on the PC as the '**`EF6550xx.bin`**' file. Run the '**`ES6550xx.exe`**' and the main application window will open with a progress bar for the initialisation process. Once the initialisation process is complete, one of five tabs can be selected.

Additional to the basic SPI control tab, there are:

- Three tabs that cover the record and playback functionality of the CMX655D.
- The 'Record/Playback' tab for handling data flow from/to the serial audio interface (SAI) port.
- The CML script handler tab. Scripts can be used for additional features that are not covered in the other tabs.

To select a tab simply click on the corresponding name in the row at the top of the program window. Setting or clearing the check box associated with a bit of a register will cause that bit to be set or cleared when the register is next written to. The program can be closed at any time by clicking the 'Close' button or by pressing 'Alt' and 'F4' keys simultaneously.

The buttons 'Save State' and 'Load State' allow the user to save or load a particular control configuration for all tabs of the GUI. These buttons only save or load the configuration and do not update the CMX655D registers on the EV6550D

board. After loading, the write buttons for each tab must be used to execute the new configuration. The configurations are saved with '.sta' file extension.

In the default state of the GUI, when changing control values, the ES6550 will not update the CMX655D until the 'Write' button is pressed. This allows for controls such as gains to be stepped between non-consecutive values without writing all intermediate values. Alternatively if the 'Auto Write' checkbox is ticked the ES6550 will update the CMX655D as control values are changed.

7.3.1 The SPI Control Tab

The SPI Control Tab allows the user to read from or write to any 8-bit register. The address box allows for 8-bit values however the top bit (ReadNWrite) is always controlled by the ES6550 based on the selected operation. Additionally the CMX655D internal system clock settings can be configured using this tab.

Before the registers can be programmed the clock must be set up. The Clock Ready indicator will turn green once this has been done (see Figure 6) and it will then be possible to make selections to the System Control area of the dialog. When the Clock Start button is pressed the Clock Ready indicator will change to Clock Stop. If the ES6550 times out waiting for the clock ready bit the Clock Ready indicator will remain red and Clock Stop will change back to Clock Start.

To program the PLL, first calculate and then write the value using the Calculate and Write PLL buttons respectively. The PLL input frequency 'Reference Freq' is set based on the sample rate and PLL Reference controls. The PLL settings should be written before starting the clock.

If the Auto Write box is checked, values will be written directly after any change in controls.

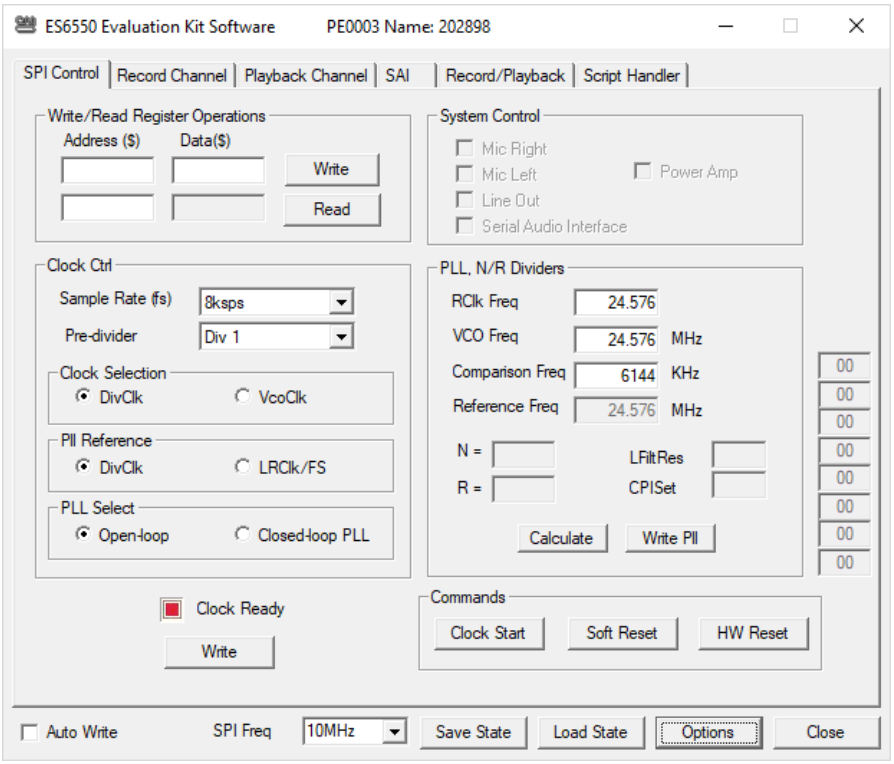


Figure 5 The SPI Control Tab – clock stopped

With the clock running all the controls in the Clock Ctrl are disabled as they can only be changed with the clock stopped. The clock can be stopped using the Clock Stop button (see Figure 6), the Clock Ready indicator will turn red once this has been done (see Figure 5).

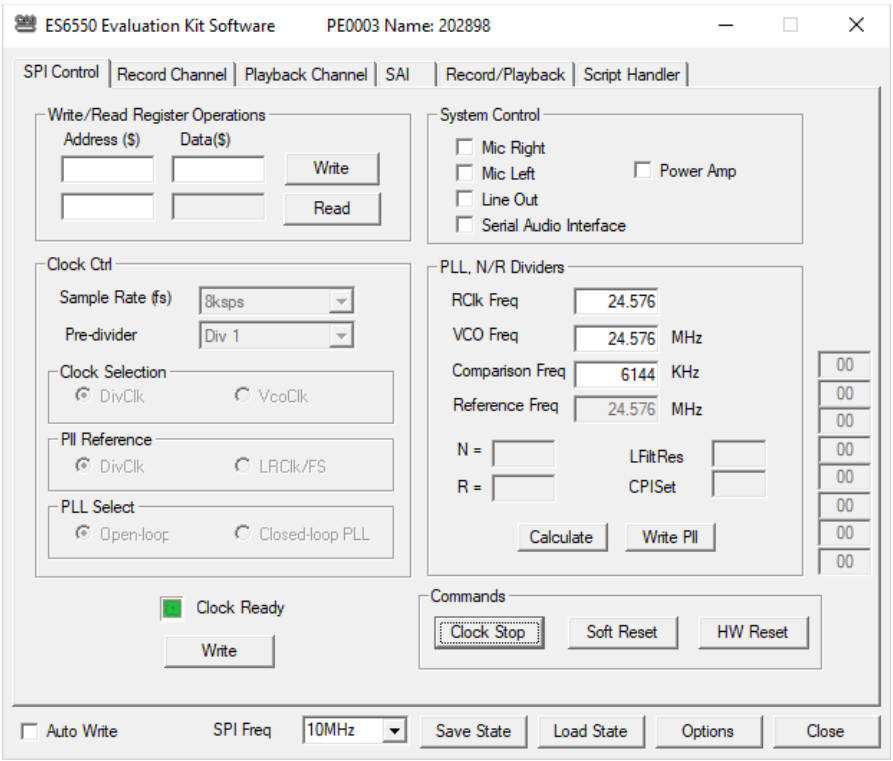


Figure 6 The SPI Control Tab – clock running

7.3.2 Record Channel Control

All controls on this tab are disabled until the clock is running, see section 7.3.1.

The noise gate feature on the CMX655D has status values to return the current attenuation. The ES6550 allows for these values to be polled. To enable polling tick the 'Continuous Read' checkbox.

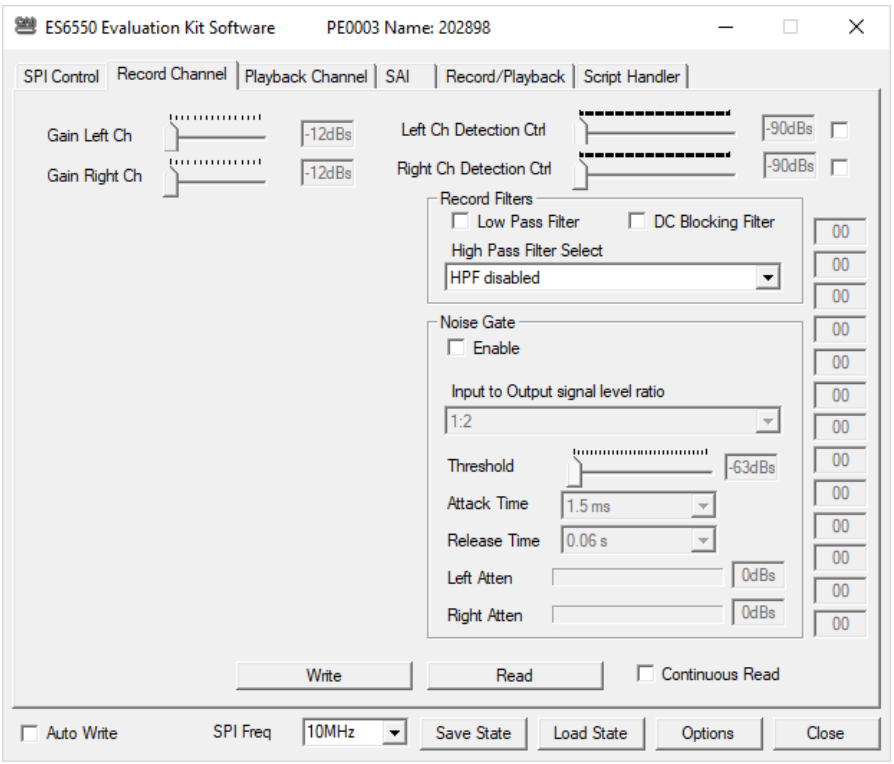


Figure 7 Record Channel Control Tab

7.3.3 Playback Channel Control

All controls on this tab are disabled until the clock is running, see section 7.3.1.

In the event of a class-D overcurrent or over temperature the CMX655D will automatically disable the amplifier and status bits get set when this happens. The ES6550 allows for polling of these status bits. To enable polling tick the Continuous Read checkbox. In the event of an overcurrent the Amp overcurrent indicator will go red. In the event of an over temperature the Thermal Warning indicator will go red. Following either indicator getting set the ES6550 will stop polling the status register and clear the Power Amp tick box on the SPI Control tab to reflect CMX655D operation. The ES6550 will clear the status indicators (when and if the 'Continuous Read' is still ticked) and will start polling the status register if the Power Amp is ticked again.

If the Continuous Read checkbox is ticked the ES6550 will automatically update the Atten Status value.

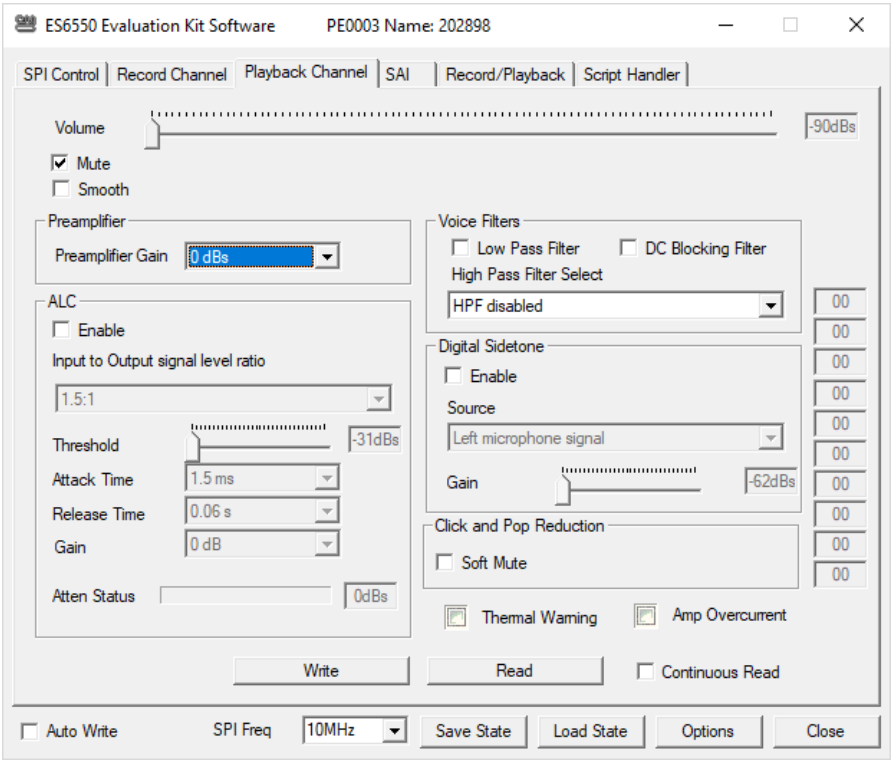


Figure 8 Playback Channel Control Tab

7.3.4 The Serial Audio Interface (SAI) Tab

All controls on this tab are disabled until the clock is running, see section 7.3.1.

This tab allows the serial audio multiplexer on the CMX655D to be configured. The serial port protocol setup is hard coded by the ES6550 to match the port setup of the PE0003.

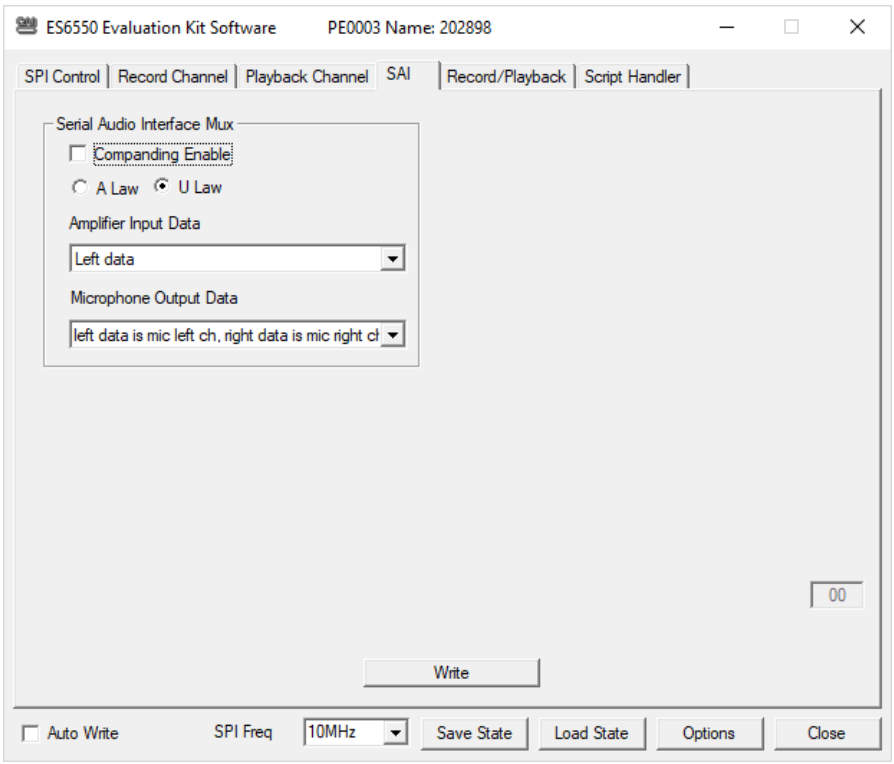


Figure 9 SAI Control Tab

7.3.5 The Record/Playback Tab

To use the functions on this tab the Serial Audio Interface checkbox on the SPI tab should be checked.

The Record/Playback tab allows the capture of, or writing of, samples over the SAI port of the EV6550D. To make use of this tab a micro SD card is required to be plugged into the socket on the underside of the PE0003. See Section 7.4.1 for card requirements and preparation details. If the micro SD card is not prepared, the program can still run but pre-existing data stored in the SD card might be corrupted.

The controls are divided into four operations, one for each button:

- Receive button – Receive the samples and store them in the micro SD card.
- Transmit button – Read the samples from the micro SD card and transmit them.
- Save button – Read the received samples from the micro SD card and write them to a file in the PC.
- Load button – Read a file from the PC and store the samples for transmission in the micro SD card.

Supported files are stereo '.wav' format at the appropriate sample rate or '.csv' comma delimited, with "Left sample, Right sample" per line, in ASCII. The file can be processed in Excel.

In the event of a problem with the micro SD card, the GUI shows a message indicating the nature of the problem, see Section 7.5.1.

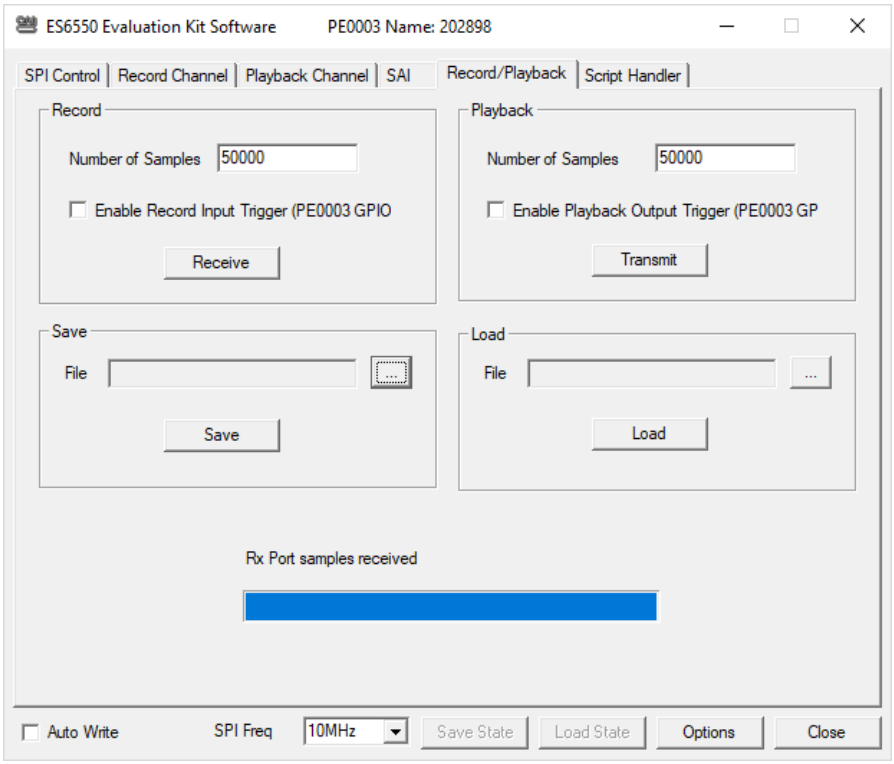


Figure 10 Record/Playback Tab

The optional receive input trigger and transmit output trigger signals can be found on the PE0003 as shown below:

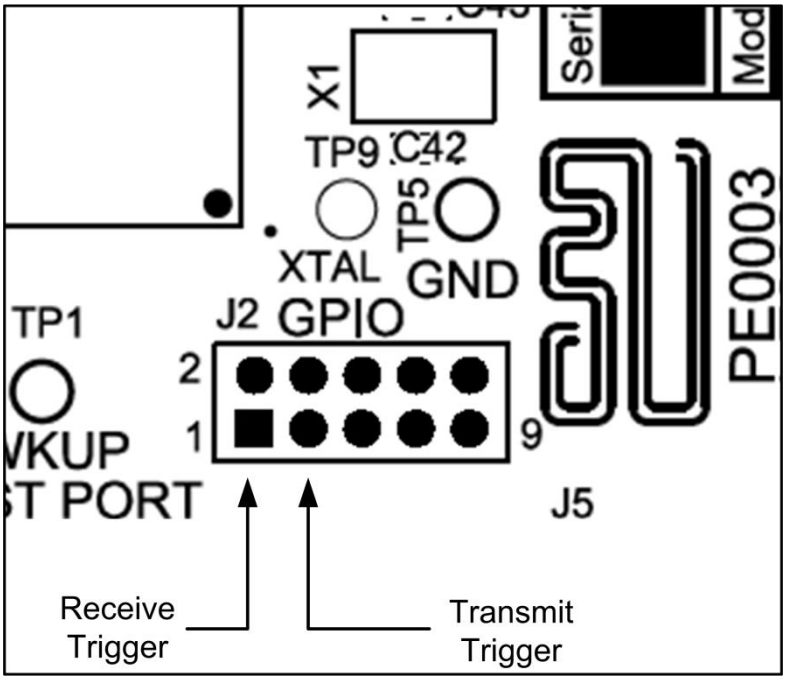


Figure 11 Receive and Transmit Trigger Locations

7.3.6 The Script Handler Tab

The Script Handler Tab (shown in Figure 12) allows the execution of script files consisting of register write, read, and delay commands. These are plain text files on the PC, which are compiled via the GUI but executed by the Microprocessor on the PE0003 board. The script language is documented separately in the “Script Language Reference” document, which

can be downloaded with the PE0003 support package from the CML website. The script handler may be used for additional features that are not covered in the other tabs, of the CMX655D.

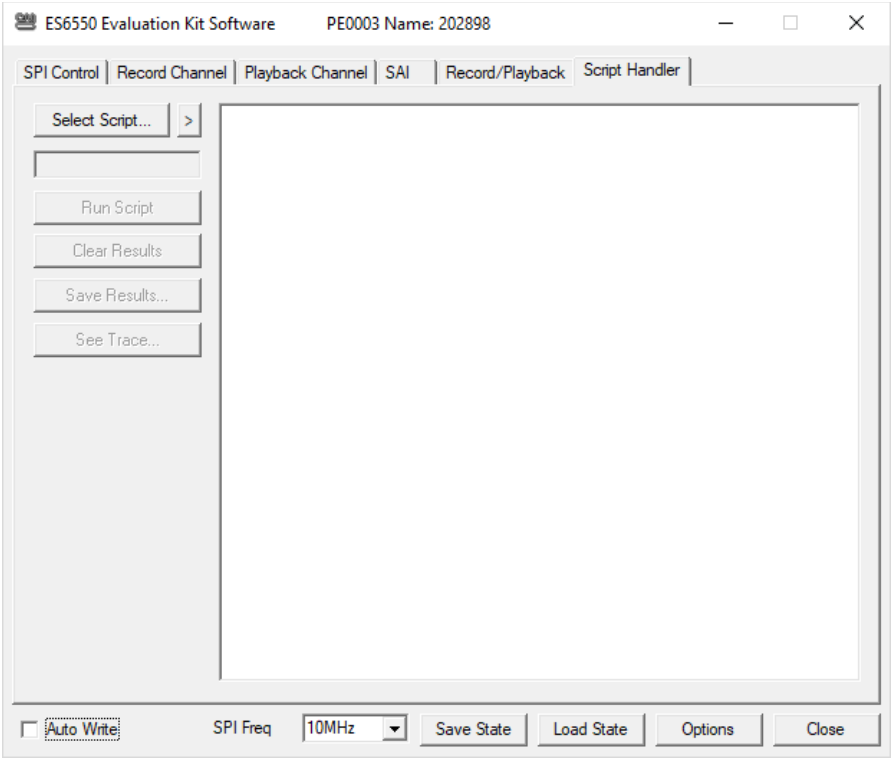


Figure 12 Script Handler Tab

To select a script file click on the 'Select Script' button. The Open File Dialog is displayed. Browse and select the script file. The folder that contains the script file will be the working folder of the script (i.e. all the files referenced in the script will be searched in this folder). Alternatively, select a script file from the recent files list. Click on the '>' button to display the list.

The results window displays the values returned by the script. These results can be saved to a text file or discarded by clicking on the 'Save Results' or 'Clear Results' buttons, respectively. When a script file is being executed the 'Run Script' button will change to the 'Abort' button, the rest of the tab will be disabled and the other tabs cannot be selected.

After a script has finished running, and when trace data is available, the 'See Trace…' button will be enabled. Up to 131072 SPI transactions can be logged in the PE0003 board. Click in the 'See Trace…' button to display the Trace dialog box. Note that the SPI transactions are only logged if the feature has been enabled in the script. See the "PE0003 Script Language Reference" document for details.

7.4 Application Information

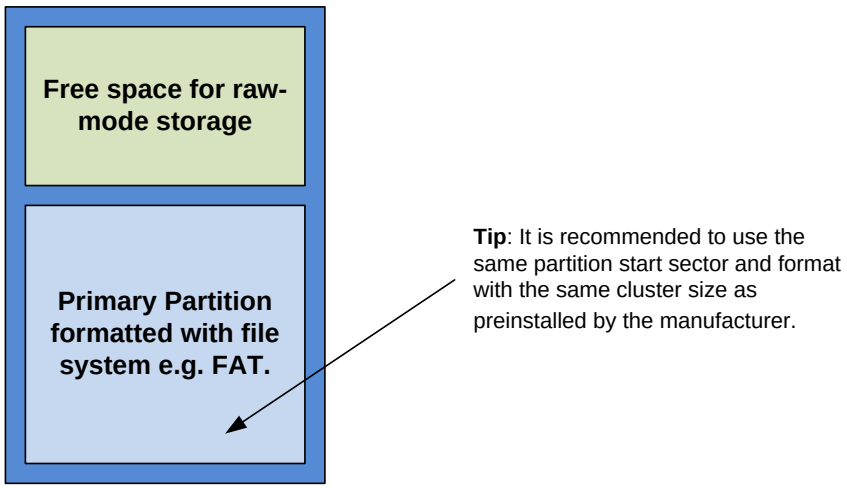
7.4.1 SD Card Preparation

Note: A class 10 micro SD card should be used.

7.4.1.1 Introduction

When using the PE0003 board to receive or transmit data in real time the SD card is accessed directly in raw mode. A file system cannot be used as the file storage is often non-linear and fragmented which can significantly impede reads or writes resulting in loss of data. A file system may still be required to coexist on the card for example to store Function Images. This is possible by shrinking the first partition containing the file system, leaving enough space for the raw mode data storage.

Note: The SD card must have a standard master boot record (MBR) and partition table installed. The partition table is read by PE0003 and used to determine if any space exists on the card. It is usual for manufacturers to supply cards with an MBR preinstalled, however in instances where a card has been completely re-formatted it is possible for the MBR to be replaced with a FAT or NTFS boot sector. In such cases the MBR and partition table should be reinstalled which can be done using the fdisk or parted tool on Linux or the Diskpart tool on Windows.



Warning: Failure to create space for the raw mode data storage may result in corruption of the file system and loss of data!

In order to maximise performance, SD card manufacturers often arrange the start of the first partition to be aligned with a significant boundary (4MB is typical). Also the file system allocation unit or cluster size is optimised to suit the memory architecture. The following procedure tries to ensure that these settings are maintained.

7.4.1.2 Shrink Partition Using Linux

There are many options available such as the graphical tool GParted. It is highly recommended to back up all the files on the SD card before proceeding in case something should go wrong with the resizing. The following instructions use commonly installed command line tools:

1. Backup the files on the SD card by copying them to a separate drive.
2. Open a command line interface and type **sudo fdisk –l**. Identify the disk device node for the SD card e.g. /dev/sdd.
3. Identify the file system cluster size on the first partition using fsck e.g. **sudo fsck /dev/sdd1 –vp**.

```
sudo fsck /dev/sdd1 -vp
fsck from util-linux 2.20.1
fsck.fat 3.0.26 (2014-03-07)
fsck.fat 3.0.26 (2014-03-07)
Checking we can access the last sector of the filesystem
Boot sector contents:
System ID "MSDOS5.0"
Media byte 0xf8 (hard disk)
       512 bytes per logical sector
     32768 bytes per cluster
      6270 reserved sectors
First FAT starts at byte 3210240 (sector 6270)
         2 FATs, 32 bit entries
    492032 bytes per FAT (= 961 sectors)
Root directory start at cluster 2 (arbitrary size)
Data area starts at byte 4194304 (sector 8192)
    122912 data clusters (4027580416 bytes)
63 sectors/track, 255 heads
      8192 hidden sectors
   7874560 sectors total
Reclaiming unconnected clusters.
Checking free cluster summary.
/dev/sdd1: 1 files, 1/122912 clusters
```

Figure 13 SD Card – Linux - fsck

4. Run the Parted tool on the disk device node identified in Figure 14, e.g. **sudo parted /dev/sdd**. Double check that the correct device is selected as the wrong one could result in loss of data.

5. Shrink the partition keeping the same start address and file system using the resize command. The following example shrinks by 500MB (Note: Parted version 2.3 was found to fail when resizing a FAT file system, if this is the case use the **resizepart** command instead and then reformat using **mkfs)**.

```
sudo parted /dev/sdd
GNU Parted 2.2
Using /dev/sdd
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted)
resize
WARNING: you are attempting to use parted to operate on (resize) a
file system.
parted's file system manipulation code is not as robust as what
you'll find in
dedicated, file-system-specific packages like e2fsprogs.  We
recommend
you use parted only to manipulate partition tables, whenever
possible.
Support for performing most operations on most types of file
systems
will be removed in an upcoming release.
Partition number?
1
Start?  [4194kB]?
End?  [4036MB]? 3536
```

Figure 14 SD Card – Linux - parted

6. Copy the files onto the SD card from the backup.

7.4.1.3 Shrink Partition on Windows

Note: If the diskpart tool is unable to shrink the volume it is likely that the card is installed with a boot sector rather than a master boot record. In this case see section 7.4.1.3.1 for instructions on installing one.

The standard Disk Management that is preinstalled on a Windows machine does not allow shrinking of partitions on removable drives. Other third party tools are available to do this, however it is still possible to achieve the same outcome using the command line Diskpart tool as follows:

1. Back up the files on the SD card by copying them to a separate drive.
2. At a command prompt, type: diskpart.
3. List the volumes available using the **LIST VOLUME** command. Identify the volume that the SD card is mounted as. The following example shows a 4GB SD card mounted as volume E.

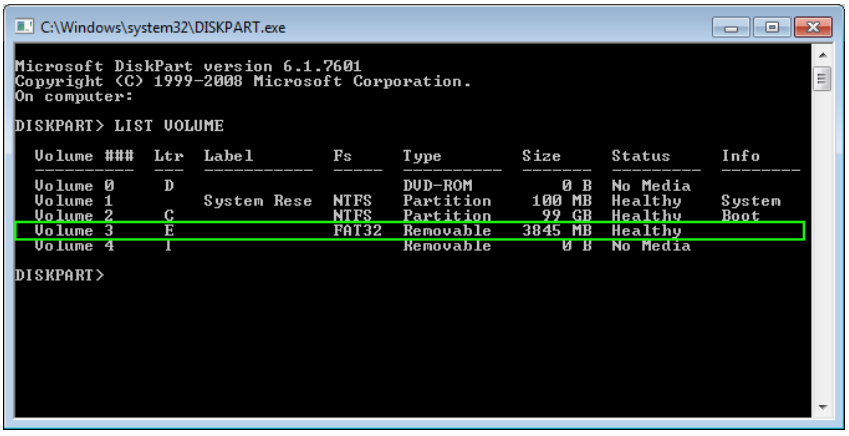


Figure 15 SD Card – Windows Diskpart - List Volumes

4. Use the **SELECT VOLUME** command to select the SD card e.g. **SELECT VOLUME E**.
5. Double check that the correct disk is selected by using the **LIST VOLUME** command again. The selected volume should have a * character in front of it. This step is very important as the wrong selection could result in corruption and data loss of other drives.

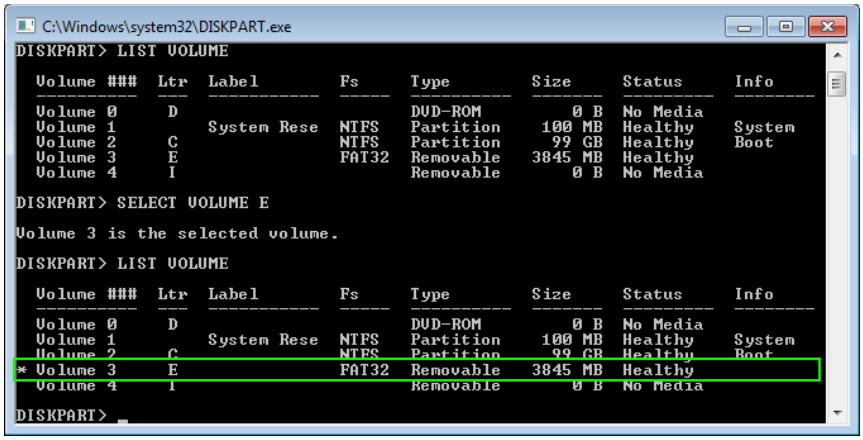


Figure 16 SD Card – Windows Diskpart - Selected Volume

6. List details about the file system using FILESYSTEM command. Make a note of the type and the allocation unit size as shown in Figure 17.

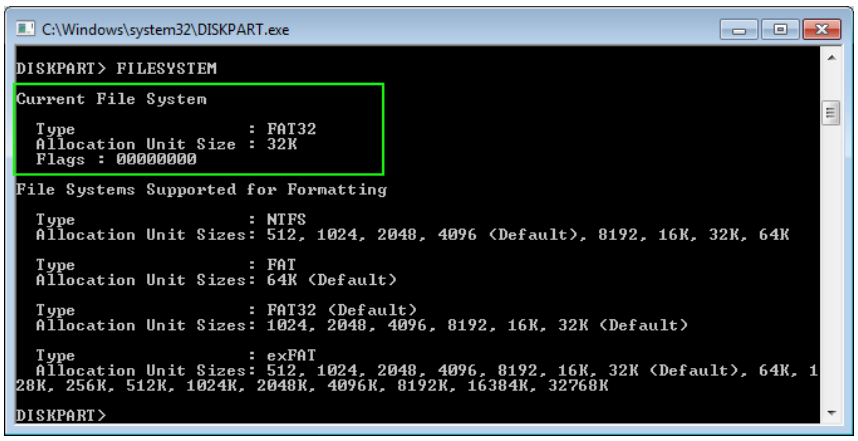


Figure 17 SD Card – Windows Diskpart - FileSystem

7. Reformat the file system to NTFS using the command **FORMAT fs=NTFS QUICK** (skip this step if the type is already NTFS). The Diskpart tool can only shrink NTFS file systems.
8. Shrink the partition by the required amount where the size is specified in Megabytes e.g. to shrink by 500MB use **SHRINK DESIRED=500**.

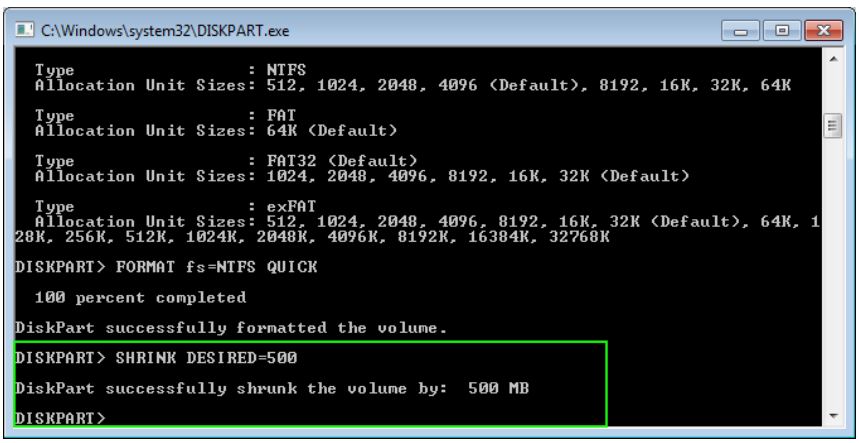


Figure 18 SD Card – Windows Diskpart - Shrink

9. Reformat to the required file system type (this is not necessary for NTFS). Use the allocation unit size as noted above, e.g. to format as FAT32 with a cluster size of 32kb use **FORMAT fs=FAT32 unit=32K**.

10. Exit the diskpart tool using the **EXIT** command.
11. Copy the files onto the SD card from the backup.

7.4.1.3.1 Install a Master Boot Record and Partition Table using Windows

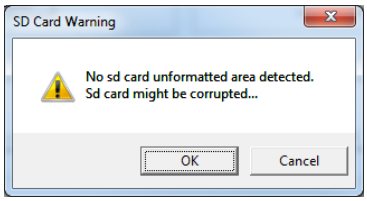
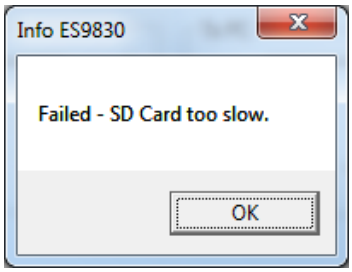
The following instructions show how to install a new master boot record with a shrunken primary partition and format it using the Diskpart tool.

1. Backup the files on the SD card by copying them to a separate drive.
2. At a command prompt, type: diskpart.
3. List the disks available using the **LIST DISK** command. Identify the disk number that the SD card is mounted as.
4. Having identified the disk number use the **SELECT DISK** command to select the SD card disk e.g. **SELECT DISK 3**.
5. Double check the correct disk is selected by using the **LIST DISK** command again. The selected disk should have * character in front of it. This step is very important as the wrong selection could result in corruption and data loss of other drives.
6. Use the **CLEAN** command to clear all the information off the disk (all data will be lost).
7. Create a new partition using **CREATE PARTITION PRIMARY** command.
8. Select the partition using **SELECT PARTITION 1**.
9. Shrink the partition by the required amount where the size is specified in Megabytes e.g. to shrink by 500MB use **SHRINK DESIRED=500**.
10. Format the partition as required e.g. **FORMAT fs=FAT32 unit=32k**.
11. Exit the diskpart tool using the **EXIT** command.
12. Copy the files onto the SD card from the backup.

7.5 Troubleshooting

7.5.1 SD Card

Table 7 Possible Errors – SD Card

Error Observed	Possible Cause	Remedy
	In order to improve the performance of the micro SD card operations, the use of a filesystem is discarded. PE0003 uses non-allocated memory as storage, this unallocated memory should be after the first partition. If no such space is detected, PE0003 uses some specific micro SD card memory positions (512MB, by default). Therefore any data stored in these positions, will get corrupted.	See section 7.4.1 to format the SD card.
	SD card write cycle is too slow for the rate at which samples are read from the EV6550 board, an overrun in internal buffers has occurred.	See section 7.4.1 for SD card requirements. Try a class 10 or a different manufacture.

7.5.2 Clock Options

Table 8 Possible Errors - Clock Options

Error Observed	Possible Cause	Remedy
Poor clock quality when using external clock source.	With a low frequency sine wave supplied to the on board clock buffer high levels of jitter can occur.	If the input clock frequency is <5MHz ensure that a square wave is used.

8 Performance Specification

8.1 Electrical Performance

8.1.1 Absolute Maximum Ratings

Exceeding these maximum ratings can result in damage to the Evaluation Kit.

	Min.	Max.	Units
Supply (V_{IN} - V_{SS})	-0.3	9.0[1]	V
Current into or out of V_{IN} and V_{SS} pins			A
Current into or out of any other connector pin			
Maximum Input Level			

8.1.2 Operating Limits

Correct operation of the Evaluation Kit outside these limits is not implied.

	Notes	Min.	Max.	Units
Supply (V_{IN} - V_{SS})		4.5	5.5	V
Supply (V_{PA} - V_{SS})		3.0	3.6	V
Xtal/External Clock Frequency				
Ambient Operating Temperature		-40	85	°C

8.1.3 Operating Characteristics

Example conditions:

For the following conditions unless otherwise specified:
Xtal Frequency = 24.576MHz, V_{IN} = 5.0V, T_{AMB} = +25°C.

	Notes	Min.	Typ.	Max.	Units
DC Parameters					
I_{DD}	1	-	6	-	mA
3V3		3.18	3.3	3.42	V
1V8		1.73	1.8	1.87	V

Notes:
1. PCB current consumption, not current consumption of the CMX655D.

[1] If the PE0003 is used with the EV6550D then the maximum supply voltage is 6.8V.

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