Technical Brief

CS423XB TO CS4235 UPGRADE

By Mark Bohm

Upgrading a system that uses the CrystalClear™ CS423xB family of devices to the new CS4235 device requires a few more changes than simply soldering down the new part. A CS423xB design can be updated to a CS4235 with no hardware modifications unless any of the following are true.

- The CS423xB MOUT (Pin 89) is used. The MOUT (Mono Output) pin is not available on the CS4235 so the mono output will not function on these designs.
- The CS423xB External Peripheral Port (Pins 1-7) are used to control an external device (like a CDROM or MODEM). The External Peripheral port function is not available on the CS4235, so the design will need to be modified.
- The Modem Logical device feature of the CS423xB is used to control a Modem. The Modem Logical Device has been removed on the CS4235.
- The CS423xB controls an IDE Interface. The two pull-down programming resistors (required on pins 10&11 on the CS423xB) have moved to pins 3&5 on the CS4235. The design will need to be modified.
- The CS423xB Line inputs (pins 86&87) are used. The line inputs have been deleted from the CS4235, so this analog input is no longer available. The design will have to be changed if this input is still required. Note that this was previously used for synthesis. AUX1 is still used for the Line In jack.
- The second joystick interface is used for the DSP serial port. The DSP serial port is only available on pins 4 through 7 on the CS4235. The design will need to be modified to support this change.
- The 3D sound of the CS4237B or CS4238B is used and the 3D sound of the CS4235 will need to function. Please see description under *Selection C & D*.

Appendix A details the specific differences, and Figure 1 shows an example circuit configuration that allows a single design to use either a CS423xB or a CS4235. It is also important to note that the drivers used on existing CS423xB platforms will not function correctly with the new CS4235 device. The drivers used with a CS4235 need to be the following version numbers or greater: Windows® 95™ (Ver 2.70), Windows 3.1™ (Ver 2.0), Windows NT™ (Ver 1.80), OS/2® (Ver 2.0). Please contact your Cirrus Logic representative for the updated BIOS kit, and drivers that support the CS4235. Please see the following documents for more detailed technical information on CS4235 designs: CS4235 Data Sheet, CRD4235-6 Reference Design, CRD4235-8 Reference Design, AN110 Application Note "CS4235 Review Checklist."

Figure 1: CS423xB to CS4235 Differences

Selection A: The CS4235 has a set of default Plug-n-Play resources in an internal ROM, so the 24C16 EEPROM is not required for proper device operation. Microsoft® WHQL™ certification does

Cirrus Logic, Inc.
P.O. Box 17847, Austin, Texas 78760
(512) 445 7222 FAX: (512) 445 7581
http://www.cirrus.com

require a unique OEM ID for each product line. This OEM ID can be implemented using a host load (motherboard implementation), or with a 24C08 EEPROM (add-in-card). A 24C01 EEPROM can be used to provide the unique OEM ID required by Microsoft WHQL, but no firmware updates or resource changes will fit into this smaller device. The 24C08 EEPROM will allow full resource changes and firmware updates along with the OEM ID, and is the recommended device for designs requiring an EEPROM. Please contact your Cirrus Logic representative for more information on the option of going with the 24C01 EEPROM.

Selection B: The CS4235 has an internal 3D sound enhancement circuit that requires a 0.01 µF capacitor to ground on pin 87. Since the CS423xB devices list this pin as LLINE (which requires a cap to ground if unused), the choice of a 0.01 µF capacitor will function for both device types.

Selection C & D: The CS423xB series of devices requires a 1000 pF capacitor to ground on pins 76 & 77. This configuration has changed on the CS4235. The CS4235 requires one 1000 pF capacitor to be connected between pins 76 & 77, and no capacitors to ground. The C73 capacitor (bubble C) will only be populated for CS4235 designs, and C25 & C26 (bubble D) will only be populated for CS423xB designs. Note that without this change, the 3D-circuitry will not function; however, the rest of the chip will function properly.

Selection E: Pin 54 on the CS423xB family is defined as VDF4, and is required to be connected to a 5 V DC voltage source. For the CS423xB configuration R42 (bubble E) will be populated, and R43 will NOT be populated. The CS4235 uses pin 54 as IRQ10, and will require R43 to be populated and R42 to be NOT populated. Note that this new IRQ is high impedence by default. Designs that have this pin connected as VDF4 will still function properly; however, the new IRQ will not be available.

Selection F: C37 is only used for CS423xB devices when pin 54 is VDF4, this capacitor will have to be removed for CS4235 devices.

Note: The CS4235 also has added some internal pull-up resistors on several pins that required external pull-ups on the CS423xB. Pins 61, 62, 69, 70 (joystick), pin 59 (MIDIN) and pins 9, 16, 95 (hardware volume control) can have the external pull-ups removed. Please note the use of external and internal pull-ups with the CS4235 will allow normal function, and no damage will occur as a result.

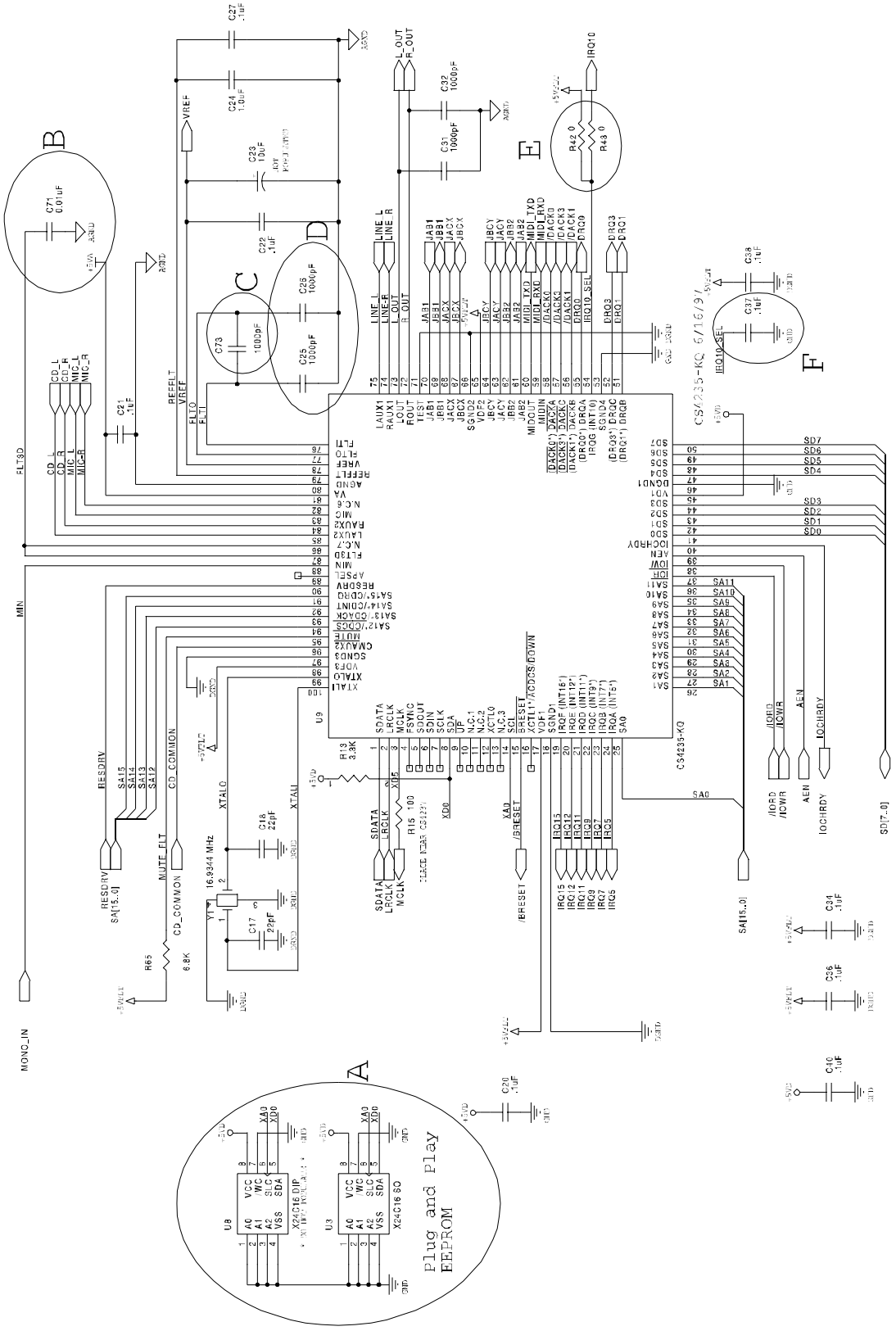

Figure 1. CS423xB to CS4235 Differences

APPENDIX A

CS4235 & CS423xB Differences

1) RFILT and LFILT capacitors are no longer needed and should be removed. On the CS4235, these pins are renamed FLTI and FLTO and should have a capacitor placed between them. They are used for the Crystal 3D Sound circuitry. Not populating this capacitor will not have any adverse affects on the part, but will result in non-optimum 3D Sound.
2) The external L/RLINE analog inputs are no longer supported. LLINE is now FLT3D and is used for the 3D Sound function. A 0.01 µF capacitor should be placed between this pin and analog ground. When external analog wavetable is desired, the AUX1 analog inputs should be used.
3) The analog microphone inputs are now mono. LMIC is changed to MIC, and RMIC has been removed.
4) Mono Out, MOUT, has been removed. The pin is redefined as APSEL and used to change the Address Port. APSEL has an internal pull-up, setting the Address Port to 0x279 for backwards compatibility.
5) VDF4 has been changed to IRQG - a seventh interrupt (typically used for INT10). The default is disabled to provide backwards compatibility.
6) The Modem Logical Device has been removed. This includes MCS and MINT.
7) Support for an external synthesizer has been removed. This includes SCS and SINT.
8) The peripheral port has been removed. This includes XD<7:0>, XIOR, XIOW, XA<0:2>. CDROM applications must now drive the ISA bus directly or through buffers.
9) The hardware strap enable for the CDROM has been moved. CS423xB designs have a pull-down on XIOR. To support the CDROM interface on the CS4235, the pull-down must be moved to the MCLK pin. Also, to enable the alternate CDROM chip select pin ACDCS, a pull-down must be added to pin SDOUT.
10) The DSP serial port is no longer supported as an option on the 2nd Joystick connector. The DSP port is still located on pins 4 through 7.
11) There is no 3.3 V ISA support.
12) The consumer IEC-958 (S/PDIF) output, supported on the CS4237B and CS4238B, has been removed.
13) Only two modes of Hardware Volume Control are supported: 2-button, and 3-button with momentary mute.
14) Internal Pull-up Resistors are now provided for the hardware volume control pins (9, 16, 95), Midi-In pin (59), and the joystick button pins (61, 62, 69, 70).