WAN_0205

WM835x Development Mode Configuration

INTRODUCTION

The WM835x device is part of a family of integrated audio and power management subsystems which provide cost effective, single-chip solutions for portable audio and multimedia systems.

The WM835x is a versatile power management device that can be configured in different operating modes – “Customer Mode” and “Development Mode” – to allow the devices to support a range of application processors.

The “Customer Mode” provides 3 predefined start-up configurations to support various mainstream processors. Whereas the “Development Mode” provides complete control over the configuration and start-up behaviour of the WM835x and allows the user to override the default values of selected registers. It enables the configuration of the WM835x before start-up. This is especially useful for evaluation and debugging, but can also be used in production.

This document focuses on the “Development Mode”, describing how this mode can be used to power up a range of mainstream processors. The intent is also to provide an overview of the interface between the WM835x and the host processor via the required PIC and EEPROM used for start-up configuration.

For details of the supported processors in “Custom Mode”, please contact Wolfson Applications support as required.

BACKGROUND

Integrating a high performance audio CODEC and power management sub-system, the WM835x family allows the end user to have a fully integrated solution without any compromise on performance. Providing advanced capability for high-quality stereo playback; with Wolfson’s low power audio technology; programmable on-chip amplifiers (which enable direct connection of headphones and microphones), the WM835x provides unparalleled audio performance. In conjunction with the audio functionality the WM8350/2 provides six DC-DC converters and four low-dropout regulators to generate programmable supply voltages for a range of components in the system solution. In should be noted that the WM8351 has reduced power functionality to address low cost applications and has 4 DC-DCs and 4 LDOs. A block diagram of the WM8350/2 is shown in Figure 1.

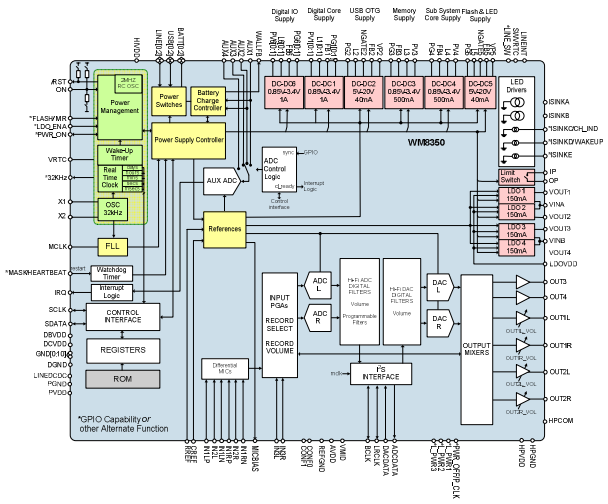

Figure 1 – WM8350/2 Block Diagram

DEVELOPMENT MODE

Although the predefined "custom modes" (3 per device) are designed to encompass several processors, there are solutions where these may not meet the exact requirements of the user's application. In these instances the development mode can be used to set up the system exactly to the user's requirements with just the addition of a few external components. Figure 2 shows a typical example of how the WM835x would be implemented in development mode.

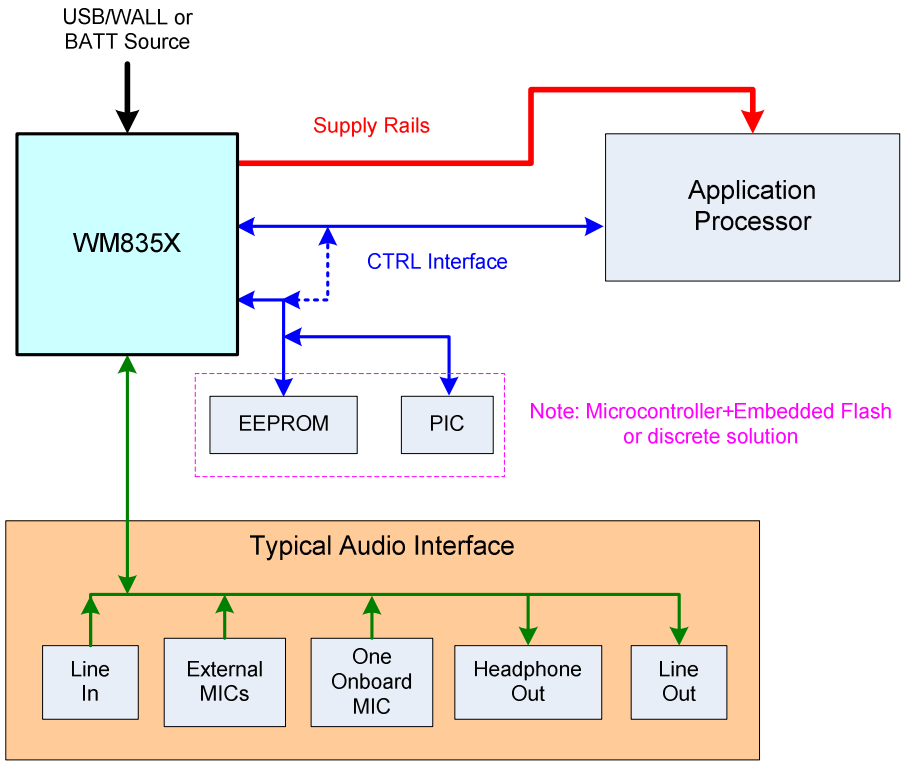

Figure 2 – WM835x System Diagram

INITIALISING THE WM835x

In Development Mode, the WM835x must be initialised by writing to the relevant start-up registers. To allow this start-up sequence to be written and the required GPIO pins to be configured, an external source must be used. Typically this is a non-volatile EEPROM (note: the EEPROM could be the embedded Flash memory of a microcontroller) which will automatically download its contents to the WM835x when required.

Operating the WM835x in Development Mode is achieved by setting the CONFIG pins (J1 (CONF0) & K1 (CONF1)) to 00 in hardware.

Once the start-up registers settings have been transmitted to the EEPROM, a full system power cycle will then allow the WM835x to power up and be programmed by the EEPROM.

A microcontroller (PIC) should be used to control the register writes from the EEPROM to the WM835x. GPIO1 of the WM835X can be used as a program flag (i.e. a DO_CONF output). If the logic level of the pin at power-up is high, this signifies that the WM835x is programmed and the register settings have been held by the valid RTC supply. If the level on the GPIO1 pin is low, it highlights that the WM835x need to be programmed. The GPIO1 pin will be input to a GPIO on the PIC, after a POR the PIC will sample the logic level on the GPIO and if required, download the EEPROM content to the WM835x; otherwise if will go into sleep state waking only after a POR.

The control interface that is used to program the start-up sequence is on pins B11 (GPIO10) for SCLK and C10 (GPIO11) for SDATA; the secondary control interface which is enabled by defaults in standard mode.

Figure 3 shows the recommended initialisation through the start-up procedure.

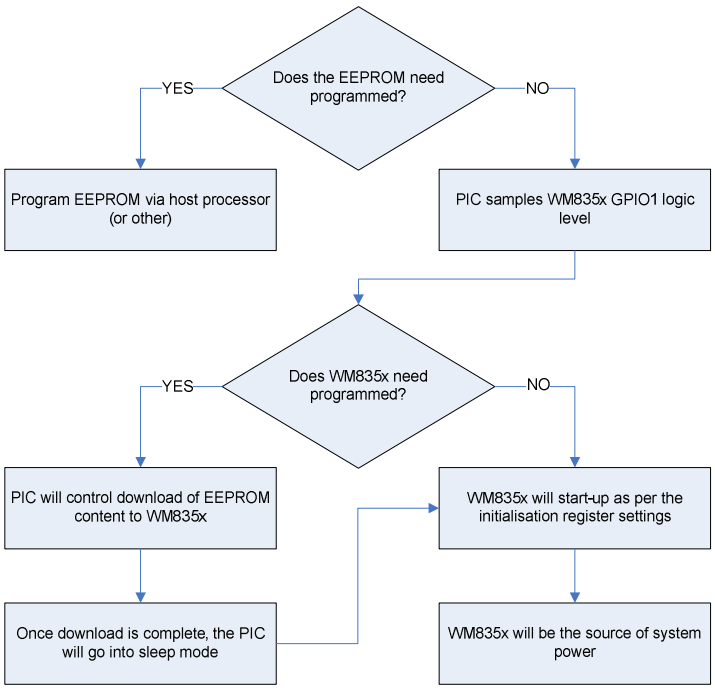

Figure 3 – WM835x Initialisation Procedure

CONTROL INTERFACE

The WM835x has the option to be controlled via the most widely used control interface i.e. I^2C and SPI, as shown in Table 1 and Table 2.

Though, other control interfaces can be used, refer to WM835x datasheet section – "CONTROL INTERFACE" – for details.

PRIMARY INTERFACE (SDATA & SCLK) I^2C address = Selectable 0011010[R/W] (i.e. 0x34h); 0011011[R/W] (i.e. 0x36h); 0011110[R/W] (i.e. 0x3Ch); 0011111[R/W] (i.e. 0x3Eh) *(The format is "Device ID + R/W bit"=8 bits in total.)*	
SECONDARY INTERFACE (GPIO10 & 11) I^2C address = 0011010[R/W] (i.e. 34) (default initialisation address)	
I^2C	**WM835x**
SCL	SCLK (N2)
SDA	SDATA (M3)

Table 1 – I^2C Interface

SPI	**WM835x**
SCLK	SCLK (N2)
CSB	GPIO7 (N4) (i.e. CSB)
SDIN	SDATA (M3)
SDOUT	GPIO6 (M4) (i.e. SDOUT)

Table 2 – SPI Interface

SUGGESTED WM835X DEVELOPMENT MODE CONFIGURATION

Figure 4 shows a suggested WM835x configuration in Development Mode. A typical configuration sequence would include writes to some or all of the registers, which determine the WM8350x start-up behaviour.

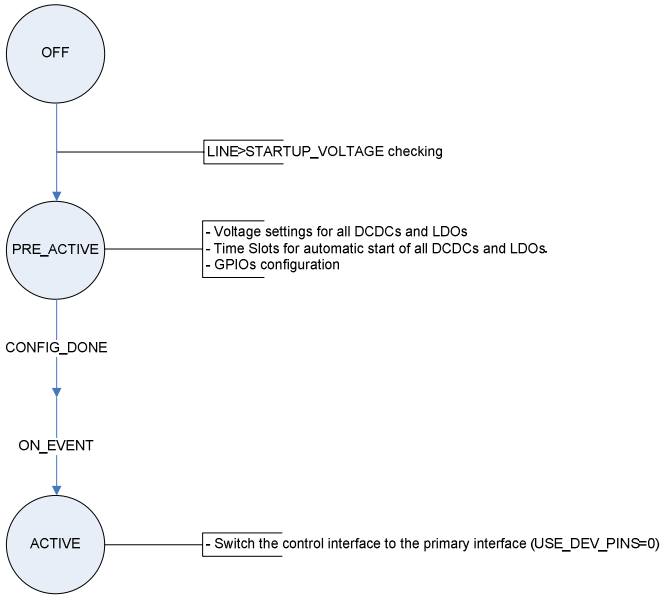

Figure 4 – WM835x Development Mode Configuration

Note that configuration only includes registers that are required for starting up correctly. All other registers should be loaded after the WM8350x has started up.

RECOMMENDED GENIE CIRCUIT (PIC WITH EMBEDDED FLASH MEMORY)

Wolfson recommend the use of a single chip microcontroller with an embedded Flash memory to configure the WM835x at start-up in Development Mode (see Table 3).

This provides a very cost effective solution due to the low-cost and small-size of the recommended microcontroller.

	Recommended PIC	Alternative PIC
Part Number	MC9S08QG8CFQE	PIC10F200/202/204/206
Manufacture	Freescale Semiconductor	Microchip
Description	Microcontroller, 8Bit MCU 8K Flash, 512Byte RAM, I^2C/SPI	Microcontroller, 8Bit MCU 8K Flash, 256-512Byte RAM, CSP
Package(s)	DFN-8 (Dual Flat No lead-8pin SMD)	6-pin SOT23, 8-pin PDIP, DFN (Dual Flat No lead-8pin SMD)
Cost	$ 0.81 (> 1000pcs)	< $ 0.5 (>1000pcs)

Table 3 – Recommended PIC (with embedded Flash memory)

Figure 5 shows the recommended interface between the EEMPROM/PIC and the WM835x.

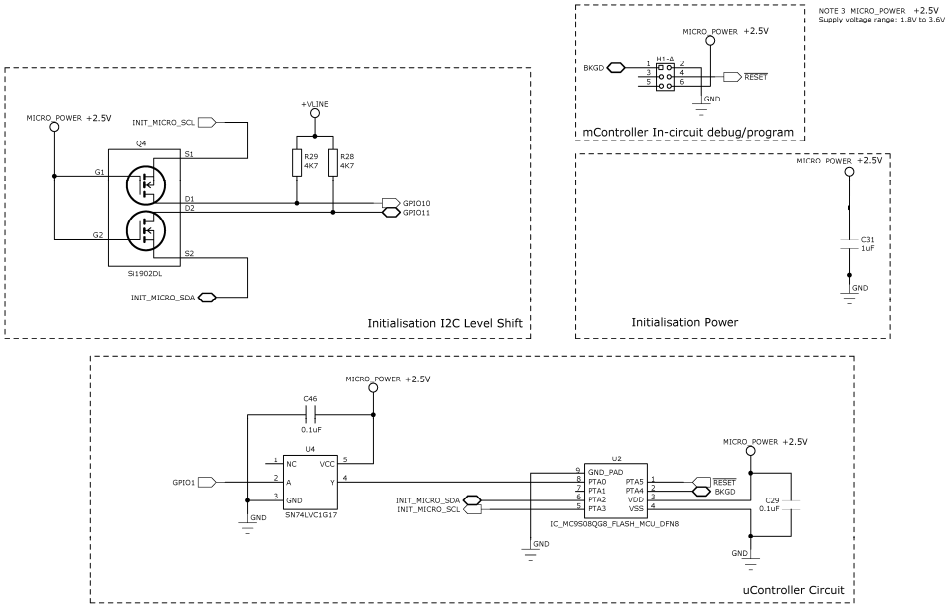

Figure 5 – Recommended Genie Circuit

The GPIO10 & GPIO11 pins are supported on the “LINE” power domain, therefore a level shift circuit is required if the control signals (i.e. SCL & SDA) are on different power domain.

The GPIO1 input is buffered using a single Schmitt-Trigger from TI (SN74LVC1G17DBVR).

An external regulated power supply set to 2.5V should be connected to “MICRO_POWER +2.5V” (H1-A connector) to provide supply to the genie circuit. The range of the external regulated power supply should be 1.8V to 3.6V.

SUMMARY/CONCLUSION

This application note has shown how the development mode of the WM835x family can be used where the predefined “custom modes” do not exactly fit the user requirements. This increases the number of application processors which can be powered by the WM835x and also allows increased flexibility for the user to change other elements of the system without the need to re-design power management solution, saving development time and cost. The WM835x power management is a versatile part providing high performance audio processing and power management which complement a range of application’s processors.

APPLICATION SUPPORT

If you require more information or require technical support, please contact the Wolfson Microelectronics Applications group through the following channels:

Email: apps@wolfsonmicro.com
Telephone Apps: +44 (0) 131 272 7070
Fax: +44 (0) 131 272 7001
Mail: Applications Engineering at the address on the last page

or contact your local Wolfson representative.

Additional information may be made available on our web site at:

http://www.wolfsonmicro.com

IMPORTANT NOTICE

Wolfson Microelectronics plc ("Wolfson") products and services are sold subject to Wolfson's terms and conditions of sale, delivery and payment supplied at the time of order acknowledgement.

Wolfson warrants performance of its products to the specifications in effect at the date of shipment. Wolfson reserves the right to make changes to its products and specifications or to discontinue any product or service without notice. Customers should therefore obtain the latest version of relevant information from Wolfson to verify that the information is current.

Testing and other quality control techniques are utilised to the extent Wolfson deems necessary to support its warranty. Specific testing of all parameters of each device is not necessarily performed unless required by law or regulation.

In order to minimise risks associated with customer applications, the customer must use adequate design and operating safeguards to minimise inherent or procedural hazards. Wolfson is not liable for applications assistance or customer product design. The customer is solely responsible for its selection and use of Wolfson products. Wolfson is not liable for such selection or use nor for use of any circuitry other than circuitry entirely embodied in a Wolfson product.

Wolfson's products are not intended for use in life support systems, appliances, nuclear systems or systems where malfunction can reasonably be expected to result in personal injury, death or severe property or environmental damage. Any use of products by the customer for such purposes is at the customer's own risk.

Wolfson does not grant any licence (express or implied) under any patent right, copyright, mask work right or other intellectual property right of Wolfson covering or relating to any combination, machine, or process in which its products or services might be or are used. Any provision or publication of any third party's products or services does not constitute Wolfson's approval, licence, warranty or endorsement thereof. Any third party trade marks contained in this document belong to the respective third party owner.

Reproduction of information from Wolfson datasheets is permissible only if reproduction is without alteration and is accompanied by all associated copyright, proprietary and other notices (including this notice) and conditions. Wolfson is not liable for any unauthorised alteration of such information or for any reliance placed thereon.

Any representations made, warranties given, and/or liabilities accepted by any person which differ from those contained in this datasheet or in Wolfson's standard terms and conditions of sale, delivery and payment are made, given and/or accepted at that person's own risk. Wolfson is not liable for any such representations, warranties or liabilities or for any reliance placed thereon by any person.

ADDRESS:

Wolfson Microelectronics plc

Westfield House

26 Westfield Road/

Edinburgh

EH11 2QB

United Kingdom

Tel :: +44 (0)131 272 7000

Fax :: +44 (0)131 272 7001