Actions-micro AM8350 Datasheet

Document Number: AM8350 Datasheet
Revision 1.0.0
Release date: 11/05/2022

Actions Microelectronics Co., Ltd.
701, 7floor, Golder Plaza, No.10 huayuandonglu, Haidian District,
Beijing, China

Declaration

Circuit diagrams and other information relating to products of Actions Microelectronics Company, Ltd. - are included as a means of illustrating typical applications. Consequently, complete information sufficient for construction purposes is not necessarily given. Although the information has been examined and is believed to be accurate, Actions-micro makes no representations or warranties with respect to the accuracy or completeness of the contents of this publication and disclaims any responsibility for inaccuracies. Information in this document is provided solely to enable use of Actions-micro
presented in this document does not form part of any quotation or contract for sale. Actions-micro assumes no liability whatsoever, including infringement of any patent or copyright, for sale and use of Actions-micro products, except as may expressly be provided in Actions-micro
All sales of any Actions-micro products are expressly conditional on your agreement to the terms and conditions of the most recently dated version of Actions-micro
date of your order.

The provision of this information does not convey to the purchaser of the described semiconductor devices any licenses under any patent rights, copyright, trademark rights, rights in trade secrets and/or know how, or any other intellectual property rights of Actions-micro or others, however denominated, whether by express or implied representation, by estoppel, or otherwise.
supers e316(p)-5(er)-5(ty)-168(d)-5(escr2o)-5(v)-5(id)-46d so21sesps
Information contained herein relates solely to the Actions-micro products described herein and abrogates and supersedes, as of the release date of this publication2.1 63.72.0l2ea37ETtb du

ACTIONS-MICRO DISCLAIMS AND EXCLUDES ANY AND ALL WARRANTIES, INCLUDING WITHOUT LIMITATION ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, AND AGAINST INFRINGEMENT AND THE LIKE, AND ANY AND ALL WARRANTIES ARISING FROM ANY COURSE OF DEALING OR USAGE OF TRADE.

IN NO EVENT SHALL ACTIONS-MICRO BE RELIABLE FOR ANY DIRECT, INCIDENTAL, INDIRECT, SPECIAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES; OR FOR LOST DATA, PROFITS, SAVINGS OR REVENUES OF ANY KIND; REGARDLESS OF THE FORM OF ACTION, WHETHER BASED ON CONTRACT; TORT; NEGLIGENCE OF ACTIONS-MICRO OR OTHERS; STRICT LIABILITY; BREACH OF WARRANTY; OR OTHERWISE; WHETHER OR NOT ANY REMEDY OF BUYER IS HELD TO HAVE FAILED OF ITS ESSENTIAL PURPOSE, AND WHETHER ACTIONS-MICRO HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES OR NOT.

Table of Contents

Revision History

Version	Date	Description	Author
1.0.0	11/09/2021	Initial Create	maweishuo

Terms and Acronyms

Terms and Acronyms	Definition
CF	Compact Flash
SM	Smart Media
XD	xD picture
SD	Secure Digital
Micro SD	Micro Secure Digital
MS	Memory Stick
MS Pro	Memory Stick Pro
MMC	Multimedia Card
SDRAM	Synchronous Dynamic Random Access Memory
MD	MicroDrive
TF	T Flash
LCD	Liquid Crystal Display
ICE	In-circuit emulation, or in-circuit emulator
JTAG	Joint Test Action Group(ANSI/ICEEE Std.11149.1-1990)
PQFP	Plastic Quad Flat Package
LQFP	Low-Profile Quad Flat Package
BGA	Ball Grid Array
PIP	Picture In Picture
TAP	TEST ACCESS PORT
RGB	Red-Green-Blue color space representation
TCON	Timing controller

General Conventions

Symbol	Description	Notes
Note		
H	In the notes column, an H indicates the pin is hidden behind the actual physical pin listed in the Alternate Functions column and is not included in the pin count. No H indicates the actual pin is listed in the Signal Name column and the Alternate Functions column lists the alternate signals present on the pin.	
Pad GP		
1	Pad group 1	
2	Pad group 2	
Dir/Pol (direction/polarity)		
I	Input	
O	Output	
B	Bidirectional	
Z	Three state output	
Pad Type		
A	Analog pad	
B	Bidirectional	
BS	Bidirectional with Schmitt trigger	
H	High-voltage(up to 3.0 V)tolerant digital input	
I	CMOS input	
IA	Analog input	
IS	Input with Schmitt trigger	
K	Contains an internal weak keeper device	
O	Output	
OA	Analog output	
OD	Open-drain	
PD	Contains an internal pull-down device	
[redacted]	Can be programmed to non pull, pull down or pull up. The default value is no pull after reset.	

1 Introduction

1.1 Overview

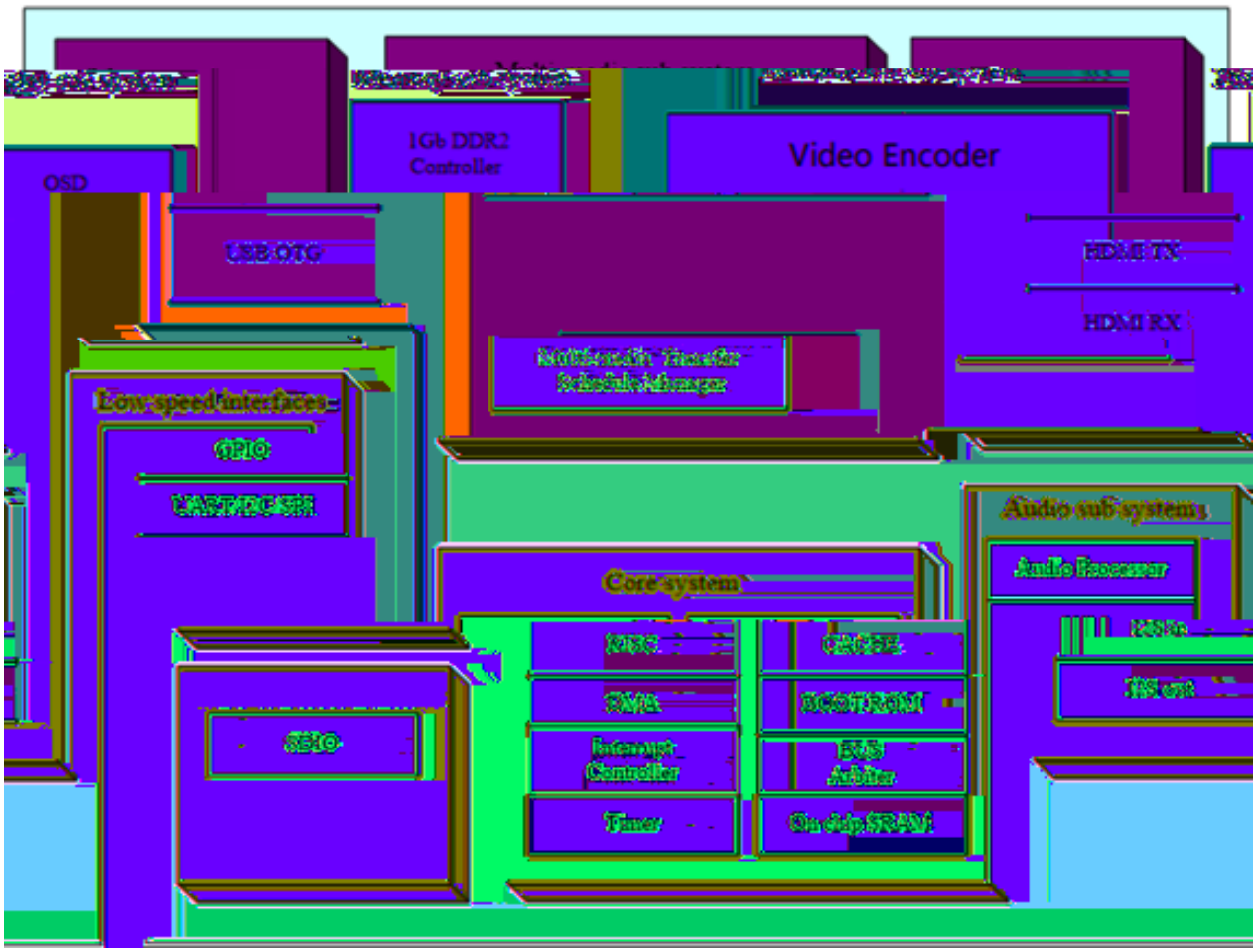
The AM8350 processor from Actions-Micro is a highly integrated mix signal SoC target at multi-media applications. The AM8350 emmedded CPU is a high performance, low power 32bit RISC core with DSP instruction extension, which can run as fast as 800MHz.

The AM8350 processor features a hardwired multi-format video encoder, which supports a large variety of popular video formats including: MJPEG/H.264 at full HD resolution.

The AM8350 multi-media processor provided display solutions with the help of on chip HDMI transmitter interface.

AM8350 is also integrated with 1 USB OTG controllers, UART, I2C, SPI, etc.

Block Diagram



AM8350 BLOCK DIAGRAM

2 Feature

The AM8350 provides high level of system integration to support a wide variety of applications. The features of the AM8350 include:

✓ **32BIT RISC CORE**
- 32K byte instruction cache and data cache
- F/W can program from DC up to 800MHz transparently HDMI
- DSP instruction for multi-media acceleration
- Static design allows changing clock at run-time for power saving

✓ **VIDEO ENCODER**
- Support ISO/IEC 14496-10/YU-T Rec.H.264
- Base Profile,Level 1-5.1

  Main Profile ,levels 1-5.1

  High Profile ,levels 1-5.1
- Support JPEG ITU-T Rec.T81(09/92),Baseline interleaved/JFIF
- 60 frames per second at 1920x1080 resolution for video all format
- 30 frames per second at 4k resolution

✓ **IMAGE/VIDEO COMPRESSOR**
- Support upto 1080P Resolution
- Support 8bit YCbCr 4:2:2 & YCbYCr/RGB
- Adaptive compress ratio up to 1:6

✓ **OSD**
- 1,2 OSD bitmap data width
- 256x128 size in 2 bit or 256x256 in 1 bit

✓ **DISPLAY INTERFACE**
- HDMI Rx/Tx

- 8 physical channels and 4 bus channels
- Stride mode support
- Software configurable priority

✓ **Boot ROM**
- On chip boot ROM with boot loader
- The system could be loaded from SPI Nor flash

✓ **USB 2.0 OTG**
- Complies with Universal Seri1 10.56 Tf1 0 0 1 120.26 611.86 Tm0 g0 G[(C)-2(om)5(pl)5(i)5(es)3(ang (en-US)>

3 Power on Sequence

The power on sequence requirements of the AM7xxx and AM8xxx products are the same, which are shown in the following figure. VDD represents the power pins supplying power for the core. VCC represents the power pins supplying power for the general purpose pads. SVCC represents the power pins supplying power for the DDR2 or DDR3 SDRAM related pads. P_RESETB is the asynchronous reset pin. PWROK is an internal signal. It is low during the power-on phase to reset all the registers in the chip. The system boots at the moment when PWROK turns to high.

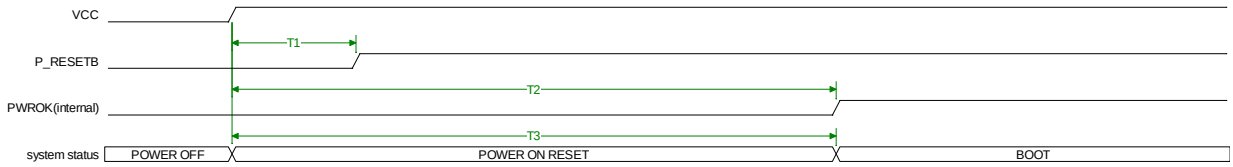


Figure 1 Power on Sequence Diagram

Timing Requirements:

1. $T1$ $20ms$
2. $T2$ $128ms$
3. $T3$ is equal to the greater one between $T1$ and $T2$
4. The power on sequence of VDD/VCC/SVCC is not cared

4 Pin Out Specification

Pin out table

PIN NUM	PIN NAME	TYPE	Function
1	P_SPINSS	B	SPI_NSS
2	VCC3	PWR	VCC3
3	DVCC_PLL	PWR	AVCC_PLL2
4	HOSCI	A	HOSCI
5	HOSCO	A	HOSCO
6	AVCC2	PWR	AVCC2
7			

79	P_DDRBA1	B	P_DDRBA1
80	P_DDRBA0	B	P_DDRBA0
81	P_DDRBA2	B	P_DDRBA2
82	P_DDRWEB	B	P_DDRWEB
83	VDD	PWR	VDD
84	SVCC	PWR	SVCC
85	P_DDRDQ4	B	P_DDRDQ4
86	P_DDRDQ3	B	P_DDRDQ3
87	P_DDRDQ1	B	P_DDRDQ1
88	P_DDRDQ6	B	P_DDRDQ6
89	P_DDRDQ12	B	P_DDRDQ12
90	P_DDRDQ11	B	P_DDRDQ11
91	P_DDRDQ9	B	P_DDRDQ9
92	P_DDRDQ14	B	P_DDRDQ14
93	P_DDRDM1	B	P_DDRDM1
94	P_DDRDM0	B	P_DDRDM0
95	VDD	PWR	VDD
96	SREF	B	SREF
97	P_DDRDQS0	B	P_DDRDQS0
98	P_DDRDQSB0	B	P_DDRDQSB0
99	P_DDRDQS1	B	P_DDRDQS1
100	P_DDRDQSB1	B	P_DDRDQSB1
101	P_DDRDQ15	B	P_DDRDQ15
102	P_DDRDQ8	B	P_DDRDQ8
103	P_DDRDQ10	B	P_DDRDQ10
104	P_DDRDQ13	B	P_DDRDQ13
105	P_DDRDQ7	B	P_DDRDQ7
106	P_DDRDQ0	B	P_DDRDQ0
107	P_DDRDQ2	B	P_DDRDQ2
108	P_DDRDQ5	B	P_DDRDQ5
109	SVCC	PWR	SVCCI
110	P_DDRCLK	B	P_DDRCLK
111	P_DDRCLKB	B	P_DDRCLKB
112	P_DDRODT	B	P_DDRODT
113	P_DDRRASB	B	P_DDRRASB
114	P_DDRCSB	B	P_DDRCSB
115	P_DDRCASB	B	P_DDRCASB
116	VDD	PWR	VDD
117	P_DDRA0	B	P_DDRA0
118	P_DDRA2	B	P_DDRA2
119	P_DDRA4		

122	P_DDRA11	B	P_DDRA11
123	SVCC	PWR	SVCC
124	VDD	PWR	VDD
125	P_IRTX	B	

5 Operating Conditions

Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNITS
V_{CC}	Power Supply (3.3V)	3.8	V
Vsvcc	Power Supply (1.5V)	1.575	V
V_{dd}	Power Supply (1.35V)	1.4	V

[redacted]

6 Crystal Requirements

Requirements for 24MHz oscillator.

Description	Specification Requirement
Nominal Frequency	24MHz
Oscillation Mode	Fundamental
Frequency Tolerance at 25	± 30ppm
Temperature Stability	± 50ppm
Shunt Capacitance (Co)	7pF max
Load Capacitance (CL)	12pF~18pF
Equivalent Series Resistance (ESR)	50ohm max
Drive Level	500uW max
Aging (at 25)	± 3ppm/year
Insulation Resistance	10meg
Net Weight	This will be various. No limitation.
Operating Temperature Range	-10~85
Storage Temperature Range	-45~125

Requirements for 32.768KHz oscillator.

Description	Specification Requirement
Nominal Frequency	32.768KHz
Oscillation Mode	Fundamental
Frequency Tolerance at 25	± 30ppm
Temperature Stability	± 50ppm
Shunt Capacitance (Co)	7pF max
Load Capacitance (CL)	12pF~18pF
Equivalent Series Resistance (ESR)	50ohm max
Drive Level	500uW max
Aging (at 25)	± 3ppm/year
Insulation Resistance	10meg
Net Weight	This will be various. No limitation.
Operating Temperature Range	-10~85
Storage Temperature Range	-45~125

7 Mechanical Specification