G400D

Overview

The G400D System on Module (SoM) is a 400 MHz ARM9. It is the first Universal Compute Modules (UCMs). Originally running .NET Micro Framework exclusively, it can now be used with TinyCLR OS.

Pricing, purchasing and other information can be found on the G400D Page on our main website.

> **TIP**
> Modules designed for the UCM standard have more functionality available when not following the rules set by the standard. It is up to you to decide how much your design will follow the UCM standard.

Ordering Part Number

- G400D SoM: G400D-SM-400

Specifications

| Spec	Value
Processor	Atmel AT91SAM9X35 ARM 926
Speed	400 MHz
Internal RAM	32 KByte (SRAM)
Internal Flash	0 KByte
External RAM	128 MByte (DDR2 SDRAM)
External Flash	4 MByte (SPI)
Dimensions	67.7 x 31.9 x 5.0 mm

Note: Resources are shared between your application and the operating system.

Peripherals

This table lists the available peripherals. The "overall" column shows the available pins if the design did not follow the UCM standard.

Peripheral	UCM Standard	Overall
UART	1	5 (including HS)
UART HS	1	1
I2C	1	1
SPI	1	1
CAN	1	2
SDIO	1	1
ADC	8	8
PWM	4	4
GPIO	12	70
IRQ	4	70
USB Client	Supported	Supported
USB Host	1	2
LCD	Supported (16bpp)	Supported (16bpp)
Ethernet PHY	Supported	Supported
WiFi	Not supported	Not supported
DCMI	Not supported	Not supported
VBAT	Supported	Supported
JTAG	Full JTAG	Full JTAG

Development Options
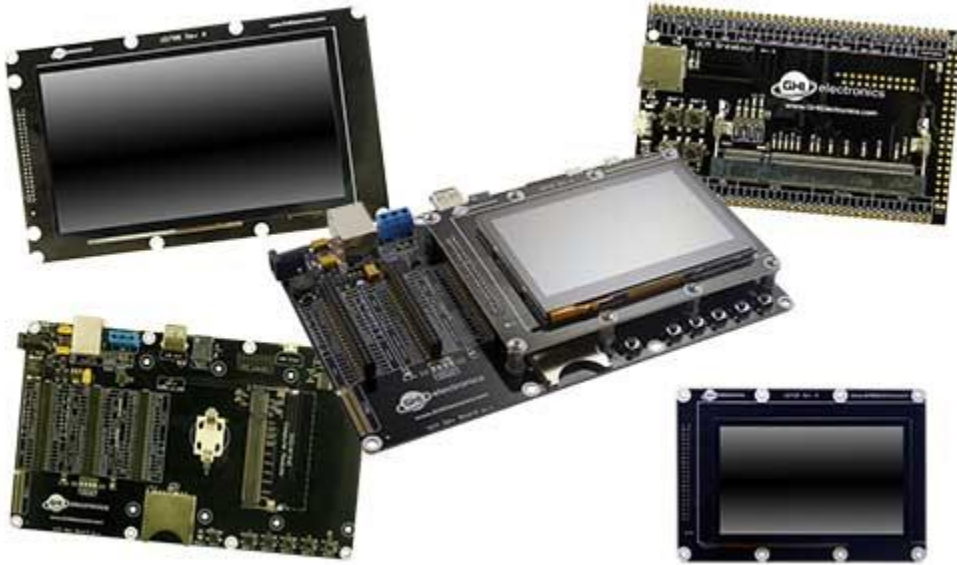
The UCM [development options](#) can greatly simplify the process of building a product or prototype using the UC5550. Options include a development board and displays which can get you programming in minutes.

.NET Micro Framework (NETMF)

The NETMF software on G400 is mature and complete. For more information on NETMF you can go to the [NETMF Introduction](#) page. The [NETMF Getting Started](#) page covers NETMF from setup of the host computer to program deployment on both an emulator and target device.

Bootloader v1 is needed for G400 to work with NETMF. It is available in the NETMF SDK.

TinyCLR OS

TinyCLR OS provides a way to program the G400 in C# or Visual Basic from the Microsoft Visual Studio integrated development environment. To get started you must first install the bootloader and firmware on the UC5550 (instructions below) and then go to the TinyCLR [Getting Started](#) page for instructions.

Loading Bootloader Version 2

Download the [G400 bootloader v2 file](#) and load onto the dataflash. The [SAM-BA Bootloader](#) has the details.

Loading the Firmware

1. Activate the bootloader, hold the LDR0 signal (SYS B) low while resetting the board.
2. Open [TinyCLR Config](#) tool.
3. Click the loader tab.
4. Select the correct COM port. If you are not seeing it then the device is not in the loader mode.
5. Click the `Update to Latest` button.

You can also update the firmware manually. Download the [firmware](#) and learn how to use the [GHI Bootloader](#)manually.

Start Coding

Now that you have installed the bootloader and firmware, you can setup your host computer and start programming. Go to the TinyCLR [Getting Started](#) page for instructions.

Code Samples

For some examples of using TinyCLR, take a look at the [TinyCLR Samples repo](#). You may also find the [TinyCLR tutorials](#) useful.

Native Code

You have the choice of loading the module with your preferred RTOS. Also, you can load [Native Code](#) in TinyCLR OS at runtime that works alongside your managed application. Native code can be used to provide improved performance or access to advanced features.

The memory area reserved for native code in TinyCLR OS on G400D starts at 0x26700000 and its length is 0x16FFFF8.

Datasheet

This documentation page replaced the legacy datasheet PDF but it is [here](#) for reference.

G400D Pinout

Many signals on the G400D are multiplexed to offer multiple functions on a single pin. Developers can decide on the pin functionality to be used through the provided libraries. Any pin with no name, function, or note must be left unconnected.

Pin	Name	Function	Pin	Name	Function	Pin	Name	Function	Pin	Name	Function
1		GND	51		GND	101	PC31		151		GND
2		ETH PHY TX-	52			102	PA0	COM2 TX	152	PC0	LCD B0
3			53			103	PA1	COM2 RX	153	PC1	LCD B1
4		ETH PHY TX+	54			104	PB12	ADC1 / TOUCH YU	154	PC2	LCD B2
5		GND	55			105	PC18	PWM0	155	PC3	LCD B3
6		ETH PHY RX-	56			106		3.3 V	156	PC4	LCD B4
7			57	PD18		107		SPI1 MISO	157	PB13	ADC2 / TOUCH XL
8		ETH PHY RX+	58	PD17		108		SPI1 MOSI	158	PB14	ADC3
9			59	PD16		109		SPI1 SCK	159	PB15	ADC4
10		ETH PHY SPEED	60		3.3 V	110	PB17	ADC6	160		3.3 V
11		ETH PHY LINK	61	PD15		111	PA4	LDR1	161	PC5	LCD G0
12			62	PD14		112	PC19	PWM1	162	PC6	LCD G1
13		GND	63	PD13		113		GND	163	PC7	LCD G2
14			64	PD12		114	PB16	ADC5	164	PC8	LCD G3 / COM5 TX
15			65		GND	115¹	PA30	I2C SDA	165	PC9	LCD G4 / COM5 RX
16			66	PD11		116¹	PA31	I2C SCL	166	PD1	TOUCH YD
22			72		3.3 V	122	PD7		172	PC12	LCD R1
23			73			123	PA15	SD D0	173	PC13	LCD R2
24			74			124		3.3 V	174	PC14	LCD R3
25			75			125	PA16	SD CMD	175	PA23	SPI2 CLK
26			76			126	PA17	SD CLK	176	PA21	SPI2 MISO
27		GND	77			127	PA18	SD D1	177		
28			78			128	PA19	SD D2	178	PA22	SPI2 MOSI
29			79		GND	129	PA20	SD D3	179		
30			80			130	PC21	PWM3	180		3.3 V
31			81			131		GND	181		
32		3.3 V	82			132	PC26		182		USBH1 D+
33			83			133	PC20	PWM2	183		VBAT
34			84			134	PA24	LDR0	184		USBH1 D-
35			85			135	PA25	MODE	185		GND
36			86			136	PA26		186		GND
37			87			137	PA27		187		RESET
38			88		3.3 V	138	PA28		188		USBH0 D+
39			89			139	PA29		189		
40		GND	90			140	PC16	COM6 TX	190		USBH0 D-
41		GND	91	PB8	ADC9	141	PC17	COM6 RX	191		
42			92	PD2	TOUCH XR	142		3.3 V	192		3.3 V
43			93	PC23		143	PC27	LCD VS	193		
44			94	PD0		144	PC28	LCD HS	194		USBC D+
45			95		GND	145	PC30	LCD CLK	195		
46		3.3 V	96	PB18		146	PC29	LCD OE	196		USBC D-
47			97	PB11	ADC0	147	PD3		197		
48			98	PA5	COM3 TX / CAN2 TD	148	PD4		198		GND
49			99	PA6	COM3 RX / CAN2 RD	149	PD5		199		
50			100	PC22		150	PD6		200	PA7	COM4 TX

¹Open drain requiring a 2.2 kΩ pull-up resistor

UCM Pinout

SO-DIMM Pin	UCM Standard	Function Name
1	AGND	GND
2	Ethernet TX-	ETH PHY TX-
3	Module Specific 1	
4	Ethernet TX+	ETH PHY TX+
5	Analog VREF-	GND
6	Ethernet RX-	ETH PHY RX-
7	Reserved	

SO-DIMM Pin	UCM Standard	Function Name
8	Ethernet RX+	ETH PHY RX+
9	Reserved	
10	Indicator A	ETH PHY LED SPEED
11	Indicator B	ETH PHY LED LINK
12	Reserved	
13	GND	GND
14	DCMI D0	
15	DCMI D1	
16	DCMI D2	
17	DCMI D3	
18	DCMI D4	
19	DCMI D5	
20	Analog 3.3V	3.3V
21	DCMI D6	
22	DCMI D7	
23	DCMI VSYNC	
24	DCMI HSYNC	
25	DCMI PIXCLK	
26	DCMI XCLK	
27	GND	GND
28	PWM E	
29	PWM F	
30	PWM G	

SO-DIMM Pin	UCM Standard	Function Name
31	PWM H	
32	Analog VREF+	3.3V
33	Reserved	
34	5V	
35	Module Specific 4	PB3
36	Module Specific 5	PB4 (DNP)
37	Module Specific 6	PB5
38	Module Specific 7	PB6
39	Module Specific 8	PB7
40	GND	GND
41	GND	GND
42	LCD 24bpp R0	
43	LCD 24bpp R1	
44	LCD 24bpp R2	
45	LCD 24bpp G0	
46	3.3V	3.3V
47	LCD 24bpp G1	
48	LCD 24bpp B0	
49	LCD 24bpp B1	
50	LCD 24bpp B2	
51	GND	GND
52	Module Specific 9	PB1
53	Reserved	

SO-DIMM Pin	UCM Standard	Function Name
54	Reserved	
55	Reserved	
56	5V	
57	IRQ A	PD18
58	IRQ B	PD17
59	IRQ C	PD16
60	3.3V	3.3V
61	IRQ D	PD15
62	GPIO A	PD14
63	GPIO B	PD13
64	GPIO C	PD12
65	GND	GND
66	GPIO D	PD11
67	GPIO E	PD10
68	GPIO F	PD9
69	GPIO G	PD8
70	5V	
71	Reserved	
72	3.3V	3.3V
73	I2C B SDA	
74	I2C B SCL	
75	UART C TX	
76	UART C RX	

SO-DIMM Pin	UCM Standard	Function Name
77	UART D TX	
78	UART D RX	
79	GND	GND
80	Reserved	
81	Reserved	
82	Reserved	
83	Reserved	
84	Reserved	
85	Reserved	
86	5V	
87	USB Device ID	
88	3.3V	3.3V
89	UART B TX	
90	UART B RX	
91	ADC A	PB8, ADC9
92	GPIO H	PD2
93	SPI B MISO	
94	SPI B MOSI	
95	GND	GND
96	SPI B SCK	
97	ADC B	PB11, ADC0
98	CAN A TD	PA5, UART3 TX, CAN2 TX
99	CAN A RD	PA6, UART3 RX, CAN2 RX

SO-DIMM Pin	UCM Standard	Function Name
100	CAN B TD	
101	CAN B RD	
102	UART HS A TX	PA0, UART2 TX
103	UART HS A RX	PA1, UART2 RX
104	ADC C	PB12, ADC1
105	PWM A	PC18, PWM0
106	3.3V	3.3V
107	SYS A	SPI1 MISO
108	Module Specific 2	SPI1 MOSI
109	Module Specific 3	SPI1 SCK
110	ADC D	PB17, ADC6
111	SYS C	PA4, LDR1
112	PWM B	PC19, PWM1
113	GND	GND
114	ADC E	PB16, ADC5
115	I2C A SDA	PA30, I2C SDA
116	I2C A SCL	PA31, I2C SCL
117	UART A RX	PA9, UART1 RX, CAN1 RX
118	UART A TX	PA10, UART1 TX, CAN1 TX
119	GPIO I	PC24
120	UART HS A RTS	PA2, UART2 RTS
121	UART HS A CTS	PA3, UART2 CTS
122	GPIO J	PD7

SO-DIMM Pin	UCM Standard	Function Name
123	SD Card D0	PA15, SD D0
124	3.3V	3.3V
125	SD Card CMD	PA16, SD CMD
126	SD Card CLK	PA17, SD CLK
127	SD Card D1	PA18, SD D1
128	SD Card D2	PA19, SD D2
129	SD Card D3	PA20, SD D3
130	PWM C	PC21, PWM3
131	GND	GND
132	GPIO K	PC26
133	PWM D	PC20, PWM2
134	SYS B	PA24, LDR0
135	SYS D	PA25, MODE
136	GPIO L	PA26
137	Module Specific 10	PA27
138	UART HS B RTS	
139	UART HS B CTS	
140	UART HS B TX	PC16, UART6 TX
141	UART HS B RX	PC17, UART6 RX
142	3.3V	3.3V
143	LCD VSYNC	PC27, LCD VSYNC
144	LCD HSYNC	PC28, LCD HSYNC
145	LCD CLK	PC30, LCD CLK

SO-DIMM Pin	UCM Standard	Function Name
146	LCD DE	PC29, LCD DE
147	Module Specific 11	PD3
148	SD Card CD	PD4
149	Module Specific 12	PD5
150	Reserved	
151	GND	GND
152	LCD B3	PC0, LCD B3
153	LCD B4	PC1, LCD B4
154	LCD B5	PC2, LCD B5
155	LCD B6	PC3, LCD B6
156	LCD B7	PC4, LCD B7
157	ADC F	PB13, ADC2
158	ADC G	PB14, ADC3
159	ADC H	PB15, ADC4
160	3.3V	3.3V
161	LCD G2	PC5, LCD G2
162	LCD G3	PC6, LCD G3
163	LCD G4	PC7, LCD G4
164	LCD G5	PC8, LCD G5, UART5 TX
165	LCD G6	PC9, LCD G6, UART5 RX
166	Module Specific 13	PD1
167	Indicator C	PA8, UART4 RX
168	LCD R7	PC15, LCD R7

SO-DIMM Pin	UCM Standard	Function Name
169	GND	GND
170	LCD G7	PC10, LCD G7
171	LCD R3	PC11, LCD R3
172	LCD R4	PC12, LCD R4
173	LCD R5	PC13, LCD R5
174	LCD R6	PC14, LCD R6
175	SPI A SCK	PA23, SPI2 SCK
176	SPI A MISO	PA21, SPI2 MISO
177	Module Specific 14	WKUP
178	SPI A MOSI	PA22, SPI2 MOSI
179	Module Specific 15	SHDN
180	3.3V	3.3V
181	Module Specific 16	PWR EN
182	Module Specific 17	USB H2+
183	VBAT	VBAT
184	Module Specific 18	USB H2-
185	GND	GND
186	GND	GND
187	RESET	RESET
188	USB Host D+	USB H1+
189	JTAG RTCK	RTCK
190	USB Host D-	USB H1-
191	JTAG TDO	TDO

SO-DIMM Pin	UCM Standard	Function Name
192	3.3V	3.3V
193	JTAG NTRST	NTRST
194	USB Device D+	USB D+
195	JTAG TDI	TDI
196	USB Device D-	USB D-
197	JTAG TCK (SWCLK)	TCK
198	GND	GND
199	JTAG TMS (SWDIO)	TMS
200	Indicator D	PA7, UART4 TX

CAN Bit Timing Settings

The following CAN bit timing parameters were calculated for a G400 driving the SN65HVD230 CAN driver chip. See the [Configuring the Bus](#) section of the [CAN Tutorial](#) for more information.

Baud	Propagation	Phase 1	Phase 2	Baudrate Prescaler	Synchronization Jump Width	Use Multi Bit Sampling	Sample Point	Max Osc. Tolerance	Max Cable Length
83.333 K	7	4	1	99	0	False	87.5%	0.31%	845M
125K	7	1	1	81	0	False	84.6%	0.38%	499M
250K	7	1	1	40	0	False	84.6%	0.38%	222M
500K	7	7	1	13	1	False	89.5%	0.41%	92M
1M	7	7	1	6	1	False	89.5%	0.41%	19M

Note: Maximum Oscillator Tolerance and Maximum Cable Length are theoretical maximums and must be tested to ensure reliability.

G400 Development Board

This is no longer in production, replaced by the [Development Options](#)

- [Schematic](#)

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