

AVR[®]
ATasicICE POD
User Guide

June 1998



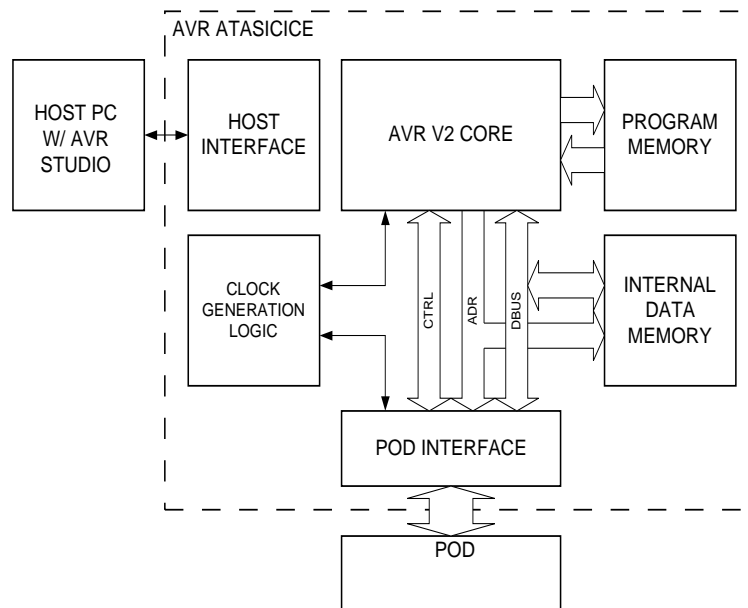


AVR[®] ATasicICE POD User Guide

1.0 Introduction The AVR ATasicICE POD is an extension to the AVR ATasicICE (ASIC ICE) which gives a quick start ASIC development platform for the AVR ASIC users. The ASIC POD includes two example designs to demonstrate the interface between the AVR core and the custom logic.

1.1 Description of the ASIC ICE Pod The ASIC ICE POD is based on a field programmable gate array (FPGA) that can be programmed to function as a custom I/O logic for the AVR core. A set of 64 I/O pins from the FPGA are made available to the user through connectors. In addition, the ASIC ICE POD includes SRAM, RS232 ports, and a clock oscillator as on-board resources.

Figure 1-1. ASIC ICE POD Block Diagram



This document describes how to configure the FPGA and to use the on-board resources to the ASIC ICE POD. The ASIC ICE interface is described in the ICEPRO ASIC Designer's Guide together with the example designs.

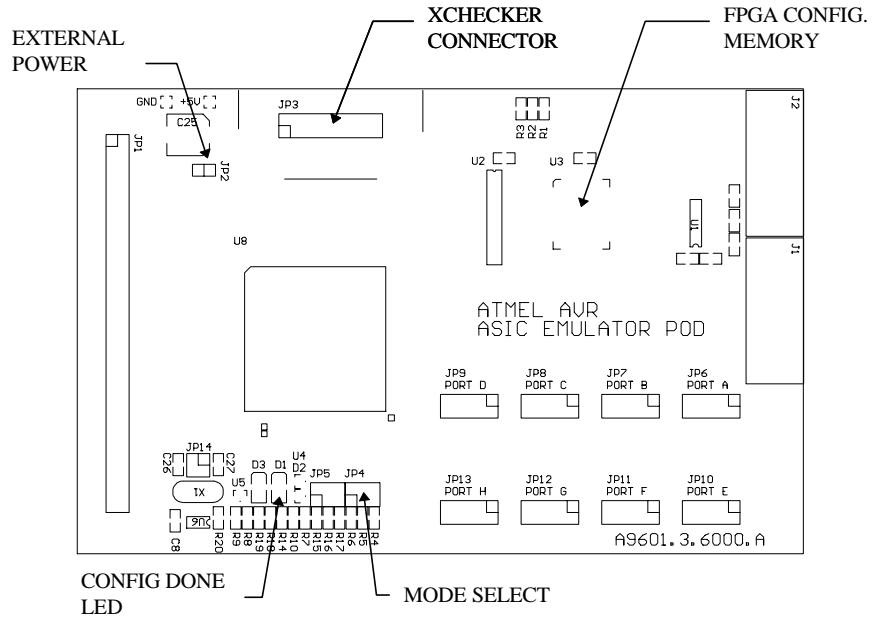
1.2 Power Supply It is recommended to use the emulator power supply which is available on the pod connector. This is done by adding a jumper to the JP2 pins (default setting, see Figure 1-2). Total current drawn from the emulator must not exceed 1A (@ 5V). At higher currents

external power should be used instead. When using an external power supply the jumper at JP2 must be removed.

WARNING! When using external power, the emulator must be switched on before the external power supply is connected. The external power must be switched off before the emulator is switched off.

1.3 FPGA Configuration

Figure 1-2. POD, FPGA Configuration



The FPGA can be configured either by using an XChecker cable or a FLASH memory containing the configuration data. Figure 1-2 shows the pod's location of the XChecker cable connector, the PLCC socket for the FLASH memory and the mode select jumpers. The (green) configuration DONE LED will be lit if the configuration process is successful.

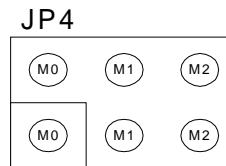
1.3.1 Configuration Mode Selection

The mode select jumpers (JP4) must be installed according to the following table:

Source	M0	M1	M2
XChecker	-	-	-
FLASH	X	X	-

Note: (X = Jumper inserted, - = No jumper inserted)

Figure 1-3. Mode Select Jumper Pin-Out



1.3.2 Configuration Using the XChecker Cable Disconnect any power sources connected to the pod and turn off the emulator. Connect the XChecker cable directly to the XChecker connector on the pod. It is not necessary to use the flying lead connectors supplied with the XChecker. Supply power and start the downloading from the XChecker download utility.

WARNING! If the XChecker cable is used to configure the FPGA, the FLASH must be removed from the socket.

1.3.3 Configuration Using FLASH Generate a binary file from the bit configuration file using the Xilinx makeprom utility. Use this file to program the FLASH in a device programmer. Supported FLASH devices are: AT29C010-JC, AT29C010A-JC and AT29C020-JC. Disconnect any power sources connected to the pod and turn off the emulator. Insert the programmed flash into the configuration socket on the pod and set the configuration mode jumpers.

1.3.4 FPGA ASIC ICE Interface Pin-out

Memory Signals

Signal Name	FPGA pin-out (physical pin number)
ADR 15:0	= {237, 235, 231, 229, 226, 224, 218, 216, 236, 234, 230, 228, 225, 223, 217, 215}
DBUS 7:0	= {13, 12, 11, 10, 9, 8, 5, 4}
XRAMRE	= {23}
XRAMWE	= {24}
IORE	= {25}
IOWE	= {26}
MRAMACK	= {27}
CPUWAIT	= {34}

Note: Pin numbering = {MSB,..., LSB}

System (Reset / Instruction) Signals

Signal Name	FPGA pin-out (physical pin number)
$\overline{\text{ARESET}}$	= {15}
IRESET	= {20}
SLEEPI	= {16}
WDRI	= {18}

Interrupt Signals

Signal Name	FPGA pin-out (physical pin number)
IRQ 4:0	= {50, 49, 48, 47, 46}
IRQACK	= {51}
GLOBINT	= {52}
IRQOK	= {53}

Note: Pin numbering = {MSB,..., LSB}



Extended Signals (Reserved For Future Use)

Signal Name	FPGA pin-out (physical pin number)
IOEXTEND 4:0	= {43, 42, 41, 39, 38}

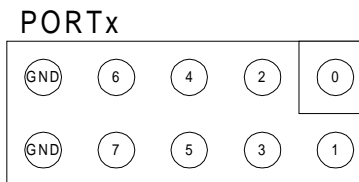
Note: Pin numbering = {MSB,..., LSB}

Clocks

Signal Name	FPGA pin-out (physical pin number)
CLKALWAYS	= {57}
EXTCLKIN	= {not connected to the FPGA}
EXTCLKEN	= {not connected to the FPGA}
CLKRUN	= {31}
CLKOSC	= {63}
CLKIO	= {118}
CLKSTOPIO	= {32}
CLKSTOPCORE	= {33}
CLKEN	= {44}
IOBUSY	= {28}

1.4 General I/O Ports The general I/O port connectors are labeled PORTA-PORTH on the pod card. These ports are directly connected to the FPGA. Each port has eight I/O pins and two ground pins. Short cables should be used when connecting additional logic on the port pins.

Figure 1-4. Port Connector Pin-Out



WARNING! The general I/O ports are sensitive to electrostatic discharges.

Ports

Signal Name	FPGA pin-out (physical pin number)
PORTA 7:0 (GIO 7:0)	= {167, 168, 169, 170, 171, 172, 175, 176}
PORTB 7:0 (GIO 15:8)	= {155, 156, 157, 160, 162, 163, 164, 165}
PORTC 7:0 (GIO 23:16)	= {142, 144, 145, 146, 147, 149, 153, 154}
PORTD 7:0 (GIO 31:24)	= {131, 132, 133, 134, 136, 137, 138, 139}
PORTE 7:0 (GIO 39:32)	= {116, 117, 124, 125, 126, 127, 128, 130}

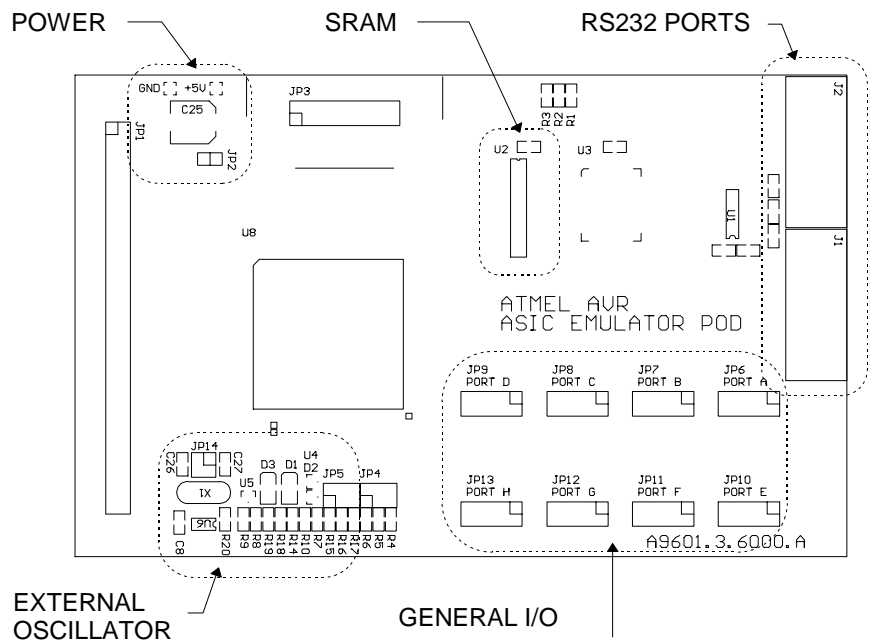
Ports (Continued)

Signal Name	FPGA pin-out (physical pin number)
PORTF 7:0 (GIO 47:40)	= {108, 109, 110, 111, 112, 113, 114, 115}
PORTG 7:0 (GIO 55:48)	= {97, 99, 100, 102, 103, 104, 105, 107}
PORTH 7:0 (GIO 63:56)	= {86, 87, 88, 92, 93, 94, 95, 96}

Note: Pin numbering = {MSB,..., LSB}

1.5 ASIC POD Resources

Figure 1-5. Pod, On-Board Resources



1.5.1 SRAM (128K bytes)

The ASIC POD includes a 128K bytes SRAM which can be used as external memory to the AVR core or as general purpose memory. The memory used is a standard asynchronous SRAM with a maximum 20 ns access/cycle time. The pin-out to the FPGA for the memory interface is shown below.

Signal Name	FPGA pin-out (physical pin number)
(F)ADR 16:0	= {2, 239, 238, 233, 232, 221, 220, 214, 213, 210, 209, 203, 202, 188, 187, 184, 183}
(F)DAT 7:0	= {123, 129, 141, 148, 152, 159, 173, 177}
(GSRAM)CS\	= {191}
(GSRAM)OE\	= {190}
(GSRAM)WE\	= {189}

Note: Pin numbering = {MSB,..., LSB}



1.5.2 RS232 Ports

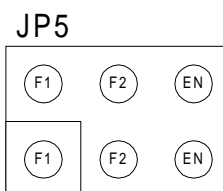
Both RS232 ports use a 9-pin DSUB connector. An one-to-one serial cable should be used when connecting the RS232 port to a COM port on a PC.

Signal Name	FPGA pin-out (physical pin number)
RxD0 (J1)	= {200}
TxD0 (J1)	= {198}
RxD1 (J2)	= {199}
TxD1 (J2)	= {197}

1.5.3 Crystal Oscillator

The crystal oscillator is connected to the emulator’s external clock input. To use this oscillator as clock source, choose External Clock in the Emulator Options menu in AVR Studio. A yellow LED (D3) will be lit when the oscillator is selected. The oscillator supports crystals with operating frequency from 10 kHz to 10 MHz. The different operating frequency ranges and their jumper setting (JP5) is shown in the table below.

Figure 1-6. Oscillator Select Jumper Pin-Out



Output Range	F(REQ)1	F(REQ)2	EN(ABLE)
10 kHz - 100 kHz	-	-	-
100 kHz - 1 MHz	-	X	-
1 MHz - 5 MHz	X	-	-
5 MHz - 10 MHz	X	X	-
High Impedance	(any)	(any)	X

Note: X = Jumper inserted, - = No jumper inserted

For the lowest frequency range, the load capacitors has to be disabled. This is done by removing the jumpers at JP14.

1.6 Appendix A: ICEPRO ASIC POD - FPGA Pinout

Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
1	GND	GND	
2	FADR16	XRAMADR	
3	FADR17	XRAMADR	
4	DBUS0	Connector	
5	DBUS1	Connector	
6	NC	Not connected	
7	NC	Not connected	
8	DBUS2	Connector	
9	DBUS3	Connector	
10	DBUS4	Connector	
11	DBUS5	Connector	
12	DBUS6	Connector	
13	DBUS7	Connector	
14	GND	GND	
15	$\overline{\text{ARESET}}$	Connector	
16	SLEEPI	Connector	
17	NC	Not connected	
18	WDRI	Connector	
19	VDD	VDD	
20	IRESET	Connector	
21	NC	Not connected	
22	GND	GND	
23	XRAMRE	Connector	
24	XRAMWE	Connector	
25	IORE	Connector	
26	IOWE	Connector	
27	MRAMACK	Connector	
28	IOBUSY	Connector	
29	GND	GND	
30	VDD	VDD	
31	CLKRUN	Connector	
32	CLKSTOPIO	Connector	
33	CLKSTOPCORE	Connector	
34	CPUWAIT	Connector	
35	NC	Not connected	



Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
36	NC	Not connected	
37	GND	GND	
38	EXTENDIO0	Connector	
39	EXTENDIO1	Connector	
40	VDD	VDD	
41	EXTENDIO2	Connector	
42	EXTENDIO3	Connector	
43	EXTENDIO4	Connector	
44	CLKEN	Connector	
45	GND	GND	
46	IRQ0	Connector	
47	IRQ1	Connector	
48	IRQ2	Connector	
49	IRQ3	Connector	
50	IRQ4	Connector	
51	IRQACK	Connector	
52	GLOBINT	Connector	
53	IRQOK	Connector	
54	NC	Not connected	
55	NC	Not connected	
56	NC	Not connected	
57	CLKALWAYS	Connector	
58	M1	CONFIG	
59	GND	GND	
60	M0	CONFIG	
61	VDD	VDD	
62	M2	CONFIG	
63	CLKOSC	Connector	
64	TP3/HDC	CONFIG	
65	NC	Not connected	
66	NC	Not connected	
67	NC	Not connected	
68	TP4/LDC	CONFIG	
69	NC	Not connected	
70	NC	Not connected	
71	NC	Not connected	
72	NC	Not connected	



Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
73	NC	Not connected	
74	NC	Not connected	
75	GND	GND	
76	NC	Not connected	
77	NC	Not connected	
78	NC	Not connected	
79	NC	Not connected	
80	VDD	VDD	
81	NC	Not connected	
82	NC	Not connected	
83	GND	GND	
84	NC	Not connected	
85	NC	Not connected	
86	FIO63	General I/O	
87	FIO62	General I/O	
88	FIO61	General I/O	
89	$\overline{\text{INIT}}$	CONFIG	
90	VDD	VDD	
91	GND	GND	
92	FIO60	General I/O	
93	FIO59	General I/O	
94	FIO58	General I/O	
95	FIO57	General I/O	
96	FIO56	General I/O	
97	FIO55	General I/O	
98	GND	GND	
99	FIO54	General I/O	
100	FIO53	General I/O	
101	VDD	VDD	
102	FIO52	General I/O	
103	FIO51	General I/O	
104	FIO50	General I/O	
105	FIO49	General I/O	
106	GND	GND	
107	FIO48	General I/O	
108	FIO47	General I/O	
109	FIO46	General I/O	



Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
110	FIO45	General I/O	
111	FIO44	General I/O	
112	FIO43	General I/O	
113	FIO42	General I/O	
114	FIO41	General I/O	
115	FIO40	General I/O	
116	FIO39	General I/O	
117	FIO38	General I/O	
118	CLKIO	Connector	
119	GND	GND	
120	DONE	CONFIG	
121	VDD	VDD	
122	PROGRAM	CONFIG	
123	FDAT7	XRAMDATA	
124	FIO37	General I/O	
125	FIO36	General I/O	
126	FIO35	General I/O	
127	FIO34	General I/O	
128	FIO33	General I/O	
129	FDAT6	XRAMDATA	
130	FIO32	General I/O	
131	FIO31	General I/O	
132	FIO30	General I/O	
133	FIO29	General I/O	
134	FIO28	General I/O	
135	GND	GND	
136	FIO27	General I/O	
137	FIO26	General I/O	
138	FIO25	General I/O	
139	FIO24	General I/O	
140	VDD	VDD	
141	FDAT5	XRAMDATA	
142	FIO23	General I/O	
143	GND	GND	
144	FIO22	General I/O	
145	FIO21	General I/O	
146	FIO20	General I/O	



Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
147	FIO19	General I/O	
148	FDAT4	XRAMDATA	
149	FIO18	General I/O	
150	VDD	VDD	
151	GND	GND	
152	FDAT3	XRAMDATA	
153	FIO17	General I/O	
154	FIO16	General I/O	
155	FIO15	General I/O	
156	FIO14	General I/O	
157	FIO13	General I/O	
158	GND	GND	
159	FDAT2	General I/O	
160	FIO12	XRAMDATA	
161	VDD	VDD	
162	FIO11	General I/O	
163	FIO10	General I/O	
164	FIO9	General I/O	
165	FIO8	General I/O	
166	GND	GND	
167	FIO7	General I/O	
168	FIO6	General I/O	
169	FIO5	General I/O	
170	FIO4	General I/O	
171	FIO3	General I/O	
172	FIO2	General I/O	
173	FDAT1	XRAMDATA	
174	NC	Not connected	
175	FIO1	General I/O	
176	FIO0	General I/O	
177	FDAT0	XRAMDATA	
178	NC	Not connected	
179	CCLK	CONFIG	
180	VDD	VDD	
181	NC	Not connected	
182	GND	GND	
183	FADR0	XRAMADR	



Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
184	FADR1	XRAMADR	
185	NC	Not connected	
186	NC	Not connected	
187	FADR3	XRAMADR	
188	FADR4	XRAMADR	
189	$\overline{\text{CSRAMWE}}$	XRAMCTRL	
190	$\overline{\text{CSRAMOE}}$	XRAMCTRL	
191	$\overline{\text{CSRAMCS}}$	XRAMCTRL	
192	NC	Not connected	
193	NC	Not connected	
194	NC	Not connected	
195	NC	Not connected	
196	GND	GND	
197	TxD1	UART1	
198	TxD0	UART0	
199	RxD1	UART1	
200	RxD0	UART0	
201	VDD	VDD	
202	FADR5	XRAMADR	
203	FADR4	XRAMADR	
204	GND	GND	
205	NC	Not connected	
206	NC	Not connected	
207	NC	Not connected	
208	NC	Not connected	
209	FADR6	XRAMADR	
210	FADR7	XRAMADR	
211	GND	GND	
212	VDD	VDD	
213	FADR8	XRAMADR	
214	FADR9	XRAMADR	
215	ADR0	Connector	
216	ADR8	Connector	
217	ADR1	Connector	
218	ADR9	Connector	
219	GND	GND	
220	FADR10	XRAMADR	



Pin no. on 240-PQFP	Emulator Signal Names	Comments	User Define
221	FADR11	XRAMADR	
222	VDD	VDD	
223	ADR2	Connector	
224	ADR10	Connector	
225	ADR3	Connector	
226	ADR11	Connector	
227	GND	GND	
228	ADR4	Connector	
229	ADR12	Connector	
230	ADR5	Connector	
231	ADR13	Connector	
232	FADR12	XRAMADR	
233	FADR13	XRAMADR	
234	ADR6	Connector	
235	ADR14	Connector	
236	ADR7	Connector	
237	ADR15	Connector	
238	FADR14	XRAMADR	
239	FADR15	XRAMADR	
240	VDD	VDD	