

Distinguishing between the Different Devices in the HT48 MCU Series

D/N : HA0022E

Introduction

The HT48 MCU series are 8-bit high performance RISC architecture microcontroller devices specially designed for multiple I/O control product applications. The series of devices are suitable for use in products such as remote controllers, fan/light controllers, washing machine controllers, electronic scale, leisure products and various subsystem controllers, all of which have HALT and wake-up features to reduce power consumption. Many features are common to all devices, however, they differ in areas such as ROM and RAM capacity, timer/counter quantity and size, I/O pin count and number of stack levels available.

Part numbers with "C" are mask version devices while those with "R" are OTP devices.

Below is a comparison table showing the different internal features of the HT48 MCU series:

Part No.	Program Memory ROM	Data Memory RAM	Timer	I/O	Instruction Period	Internal Interrupt	External Interrupt	Stack
HT48R10A-1/HT48C10-1	1K×14	64×8	1 (8)	21	0.5μS	1	1	4
HT48R30A-1/HT48C30-1	2K×14	96×8	1 (8)	25	0.5μS	1	1	4
HT48R50A-1/HT48C50-1	4K×15	160×8	2 (8,16)	35	0.5μS	2	1	6
HT48R70A-1/HT48C70-1	8K×16	224×8	2 (16,16)	56	0.5μS	2	1	16
HT48R05A-1/HT48C05-1	0.5K×14	32×8	1 (8)	13	0.5μS	1	1	2
HT48R06A-1/HT48C06-1	1K×14	64×8	1 (8)	13	0.5μS	1	1	2
HT48RA0-1/HT48CA0-1	1K×14	32×8	none	15	1μS	0	0	1
HT48RA0-2/HT48CA0-2	1K×14	32×8	none	17	1μS	0	0	1
HT48RA1/HT48CA1	8K×16	224×8	2 (8,16)	23	0.5μS	2	1	8
HT48RA3/HT48CA3	24K×16	224×8	2 (8,16)	23	0.5μS	2	1	8
HT48RA5/HT48CA5	40K×16	224×8	2 (8,16)	23	0.5μS	2	1	8

Table 1

Operating Description

I/O Port

These MCU series have considerable flexibility on their I/O ports, all of which can be used for input and output operations. It should be noted that INT and OSC pins are pin shared with different pins corresponding to the different devices in the series. Except for HT48XA0-1 and HT48XA0-2, Pins PB.0 and PB.1 are pin-shared with the buzzer pins. If the pins are used as normal I/O pins or otherwise, the correct configuration options must be selected. (Refer to other related documents)

	HT48R10A-1/ HT48C10-1	HT48R30A-1/ HT48C30-1	HT48R50A-1/ HT48C50-1	HT48R70A-1/ HT48C70-1	HT48R05A-1/ HT48C05-1	HT48R06A-1/ HT48C06-1	HT48RA0-1/ HT48CA0-1	HT48RA0-2/ HT48CA0-2	HT48RA1/ HT48CA1	HT48RA3/ HT48CA3	HT48RA5/ HT48CA5
BZ	PB0	PB0	PB0	PB0	PB0	PB0	NONE	NONE	NONE	NONE	NONE
BZ	PB1	PB1	PB1	PB1	PB1	PB1	NONE	NONE	NONE	NONE	NONE
INT	PC0	PG0	PG0	INT	PC0	PC0	NONE	NONE	PF0	PF0	PF0
OSC1	PC3	PG1	PG1	OSC1	OSC1	OSC1	OSC1	OSC1	OSC1	OSC1	OSC1
OSC2	PC4	PG2	PG2	OSC2	OSC2	OSC2	OSC2	OSC2	OSC2	OSC2	OSC2

Table 2

Internal Interrupt

The 48R50A-1/HT48C50-1 devices have two timers/counters of 8-bit and 16-bit capacity, as well as two internal Timer/Event Counter interrupt functions.

Timer/Counter

The HT48R05A-1, HT48R06A-1, HT48C10-1/48R10-1 and HT48R30-1 each have only one 8-bit timer/counter, and one associated control register. The HT48C50-1/48R50-1 devices have one 16-bit timer/counter, one 8-bit timer/counter and two associated control registers.

For details, see the Timer Clock source comparison table below:

Part No.	Internal Timer Clock Source	External Counter Clock Source (Pulse Width Measurement Mode)	Pulse Width Measurement Time Base
HT48R10A-1/HT48C10-1	f_{SYS}/f_{RTC}	TMR pin external signal	f_{SYS}/f_{RTC}
HT48R30A-1/HT48C30-1	f_{SYS}/f_{RTC}	TMR pin external signal	f_{SYS}/f_{RTC}
HT48R50A-1/HT48C50-1	f_{SYS}/f_{RTC} / instruction clock	TMR0/TMR1 pin external signal	f_{SYS}/f_{RTC} / instruction clock
HT48R70A-1/HT48C70-1	f_{RTC} / instruction clock	TMR0/TMR1 pin external signal	f_{RTC} / instruction clock
HT48R05A-1/HT48C05-1	f_{SYS}	TMR pin external signal	f_{SYS}
HT48R06A-1/HT48C06-1	f_{SYS}	TMR pin external signal	f_{SYS}
HT48RA0-1/HT48CA0-1	NONE	NONE	NONE
HT48RA0-2/HT48CA0-2	NONE	NONE	NONE
HT48RA1/HT48CA1	f_{SYS} / instruction clock	TMR0/TMR1 pin external signal	f_{SYS}/f_{RTC} / instruction clock
HT48RA3/HT48CA3	f_{SYS} / instruction clock	TMR0/TMR1 pin external signal	f_{SYS}/f_{RTC} / instruction clock
HT48RA5/HT48CA5	f_{SYS} / instruction clock	TMR0/TMR1 pin external signal	f_{SYS}/f_{RTC} / instruction clock

Table 3

Data Memory

The program memory and the data memory vary in size, in the application, the stored memory capacity should be noted which may differ in each microcontroller devices.

Stack

The stack level is different for each MCU devices. If interrupt subroutine is implemented in the program, user must take into consideration the stack source. If immediate interrupt service is required, the stack should not be full. The embedded stack level is limited.

Other

- The HT48XA0-1 and HT48XA0-2 devices have one carrier output.
- RAM range: refer to table 4
- Indirect addressing register bit: refer to table 4
- WDT clock source, refer to table 4, all unused bit set as "1"
- The bit number of memory pointer for indirect addressing mode, refer to table 4

Part No.	RAM	MP	WDT Timer Clock Source
HT48R10A-1/HT48C10-1	40H...7FH	7	WDT(RC) OSC/RTC clock/instruction clock
HT48R30A-1/HT48C30-1	20H...7FH	7	WDT(RC) OSC/RTC clock/instruction clock
HT48R50A-1/HT48C50-1	60H...FFH	8	WDT(RC) OSC/RTC clock/instruction clock
HT48R70A-1/HT48C70-1	20H...7FH	8	WDT(RC) OSC/RTC clock/instruction clock
HT48R05A-1/HT48C05-1	60H...7FH	7	WDT(RC) OSC/instruction clock
HT48R06A-1/HT48C06-1	40H...7FH	7	WDT(RC) OSC/Instruction clock
HT48RA0-1/HT48CA0-1	20H...3FH	6	Clock source divided by the frequency
HT48RA0-2/HT48CA0-2	20H...3FH	6	Clock source divided by the frequency
HT48RA1/HT48CA1	20H...FFH	8	WDT(RC) OSC/instruction clock
HT48RA3/HT48CA3	20H...FFH	8	WDT(RC) OSC/instruction clock
HT48RA5/HT48CA5	20H...FFH	8	WDT(RC) OSC/instruction clock

Table 4