1 PRODUCT OVERVIEW

S3C8-SERIES MICROCONTROLLERS

Samsung's S3C8 series of 8-bit single-chip CMOS microcontrollers offers a fast and efficient CPU, a wide range of integrated peripherals, and various mask-programmable ROM sizes. Important CPU features include:

— Efficient register-oriented architecture
— Selectable CPU clock sources
— Idle and Stop power-down mode release by interrupt
— Built-in basic timer with watchdog function

A sophisticated interrupt structure recognizes up to eight interrupt levels. Each level can have one or more interrupt sources and vectors. Fast interrupt processing (within a minimum six CPU clocks) can be assigned to specific interrupt levels.

S3C80F7/C80F9/C80G7/C80G9 Microcontroller

The S3C80F7/C80F9/C80G7/C80G9 single-chip CMOS microcontroller is fabricated using a highly advanced CMOS process and is based on Samsung's newest CPU architecture.

The S3C80F9/C80G9 is the microcontroller which has 32-Kbyte mask-programmable ROM and S3C80F7/C80G7 is the microcontroller which has 24-Kbyte mask-programmable ROM.
The S3P80F9/P80G9 is the microcontroller which has 32-Kbyte one-time-programmable EPROM and S3P80F7/P80G7 is the microcontroller which has 24-Kbyte one-time-programmable EPROM.

Using a proven modular design approach, Samsung engineers developed S3C80F7/C80F9/C80G7/C80G9 by integrating the following peripheral modules with the powerful SAM87 RC core:

— Internal LVD circuit and 16 bit-programmable pins for external interrupts.
— One 8-bit basic timer for oscillation stabilization and watchdog function (system reset).
— One 8-bit timer/counter and one 16-bit timer/counter with selectable operating modes.
— One 8-bit counter with auto-reload function and one-shot or repeat control.

The S3C80F7/C80F9/C80G7/C80G9 is a versatile general-purpose microcontroller which is especially suitable for use as remote transmitter controller. It is currently available in a 32-pin SOP, 42-pin SDIP and 44-pin QFP package.

FEATURES

CPU

- SAM87RC CPU core

Memory

- 32-Kbyte internal ROM (S3C80F9/C80G9) : 0000H–7FFFH
- 24-Kbyte internal ROM (S3C80F7/C80G7) : 0000H–5FFFH
- Data memory: 272-byte RAM (318 register)

Instruction Set

- 78 instructions
- IDLE and STOP instructions added for power-down modes

Instruction Execution Time

- 500 ns at 8-MHz f_{OSC} (minimum)

Interrupts

- 22 interrupt sources with 16 vector and 7 level.

I/O Ports

- Three 8-bit I/O ports (P0–P2), one 8-bit output port(P4) and 6-bit port (P3) for a total of 38 bit-programmable pins.(44-QFP)
- Three 8-bit I/O ports (P0–P2), one 8-bit output port(P4) and 4-bit port (P3) for a total of 36 bit-programmable pins.(42-SDIP)
- Three 8-bit I/O ports (P0–P2) and one 2-bit I/O port (P3) for a total of 26-bit programmable pins. (32-SOP)

Timers and Timer/Counters

- One programmable 8-bit basic timer (BT) for oscillation stabilization control or watchdog timer (software reset) function
- One 8-bit timer/counter (Timer 0) with three operating modes; Interval mode, Capture and PWM mode.
- One 16-bit timer/counter (Timer1) with two operating modes; Interval mode and Capture.

Carrier Frequency Generator

- One 8-bit counter with auto-reload function and one-shot or repeat control (Counter A)

Back-up mode

- When V_{DD} is lower than V_{LVD}, the chip enters Back-up mode to block oscillation and reduce the current consumption.

  In S3C80G7/C80G9, this function is disabled when operating state is “STOP mode”.
- When RESET pin is lower than Input Low Voltage (V_{IL}), the chip enters Back-up mode to block oscillation and reduce the current consumption.

Low Voltage Detect Circuit

- Low voltage detect to get into Back-up mode.
- Low level detect voltage
  – S3C80F7/C80F9: 2.20 V (Typ) ± 200mV
  – S3C80G7/C80G9: 1.90 V (Typ) ± 200mV

Operating Temperature Range

- –40 °C to + 85 °C

Operating Voltage Range

- 1.7V to 5.0V at 4 MHz f_{OSC} (S3C80G7/C80G9)
- 2.0V to 5.0V at 8 MHz f_{OSC} (S3C80F7/C80F9)

Package Type

- 44-pin QFP-1010B
- 42-pin SDIP
- 32-pin SOP

BLOCK DIAGRAM

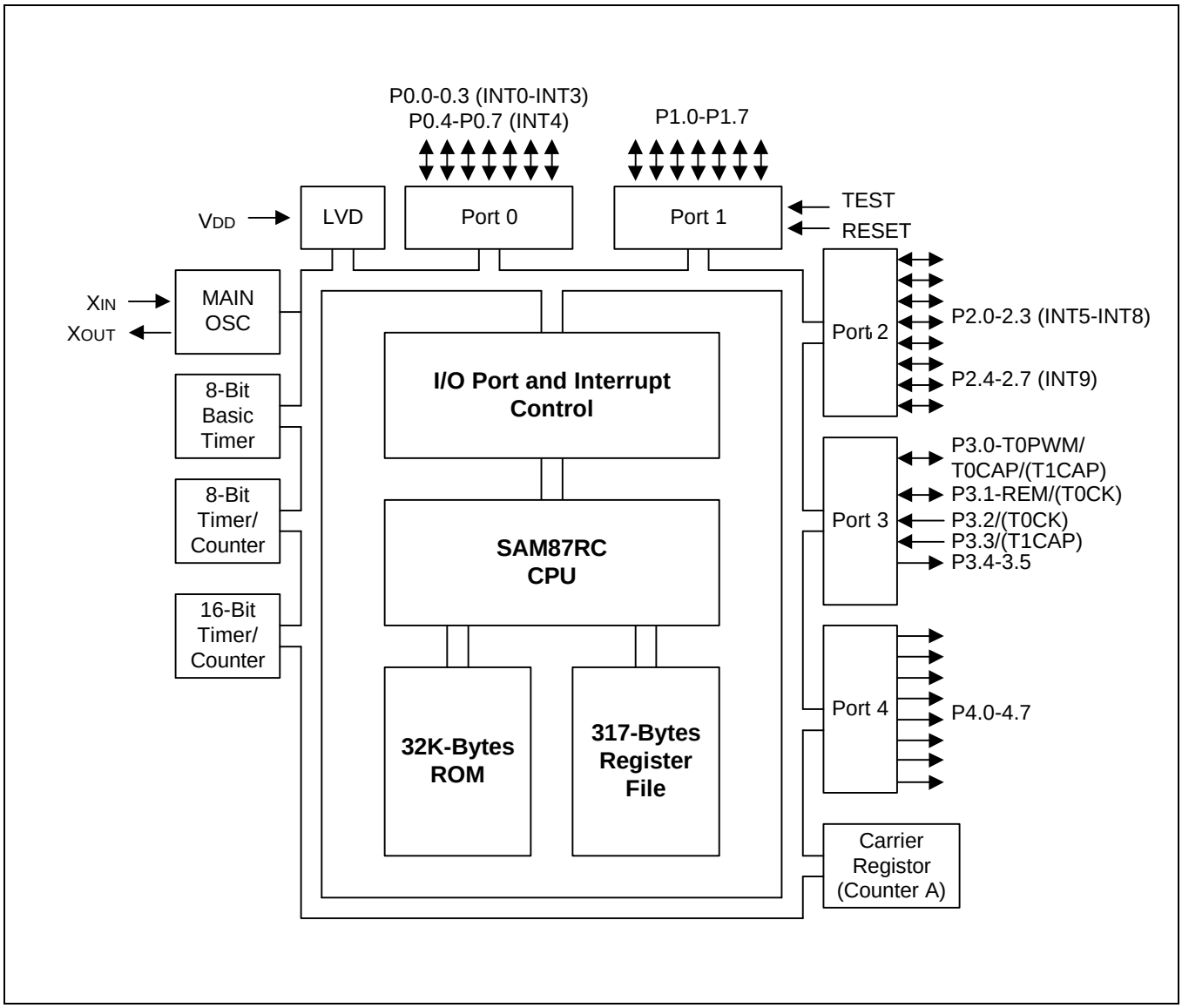


Figure 1-1. Block Diagram

PIN ASSIGNMENTS

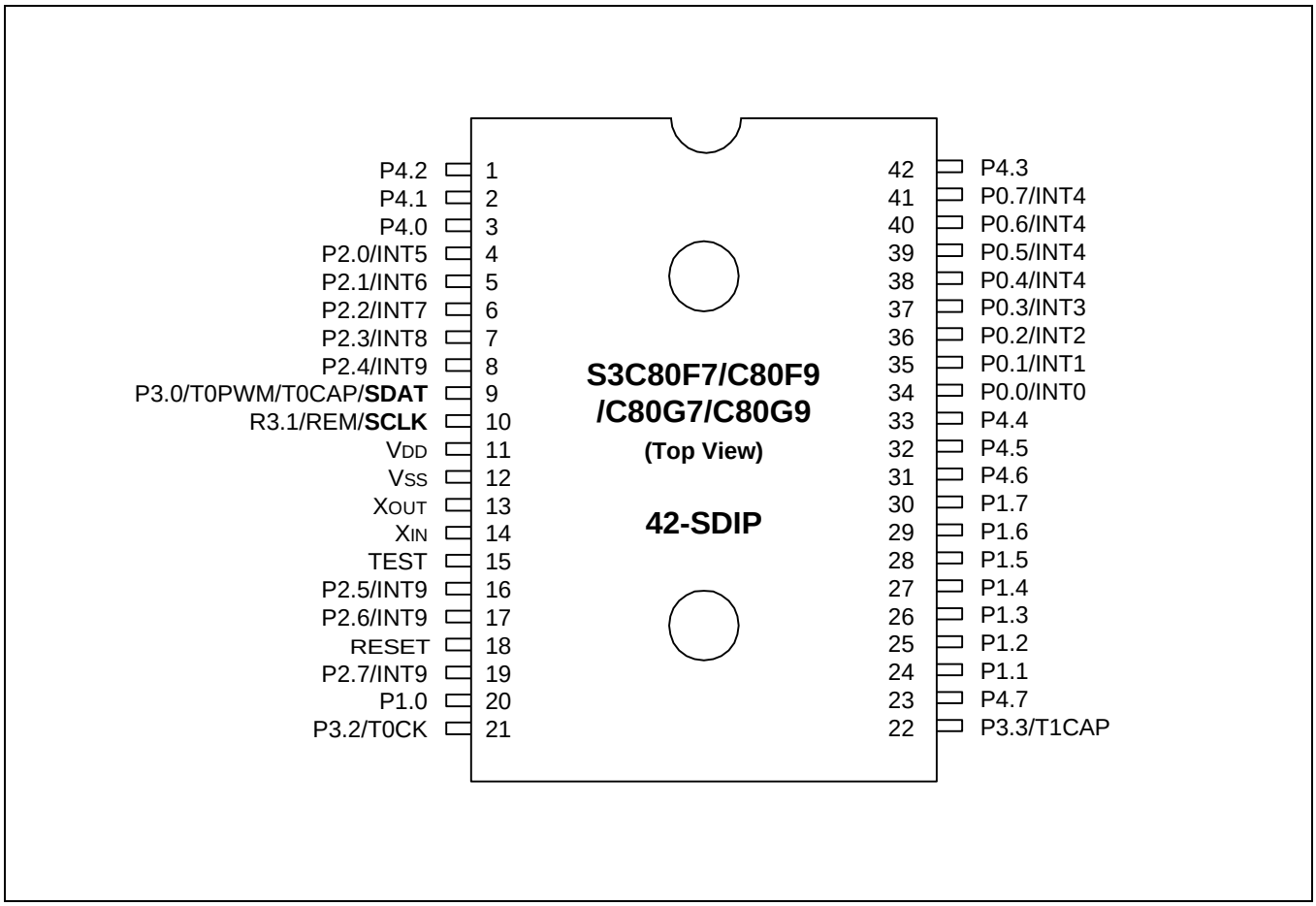


Figure 1-2. Pin Assignment Diagram (42-Pin SDIP Package)

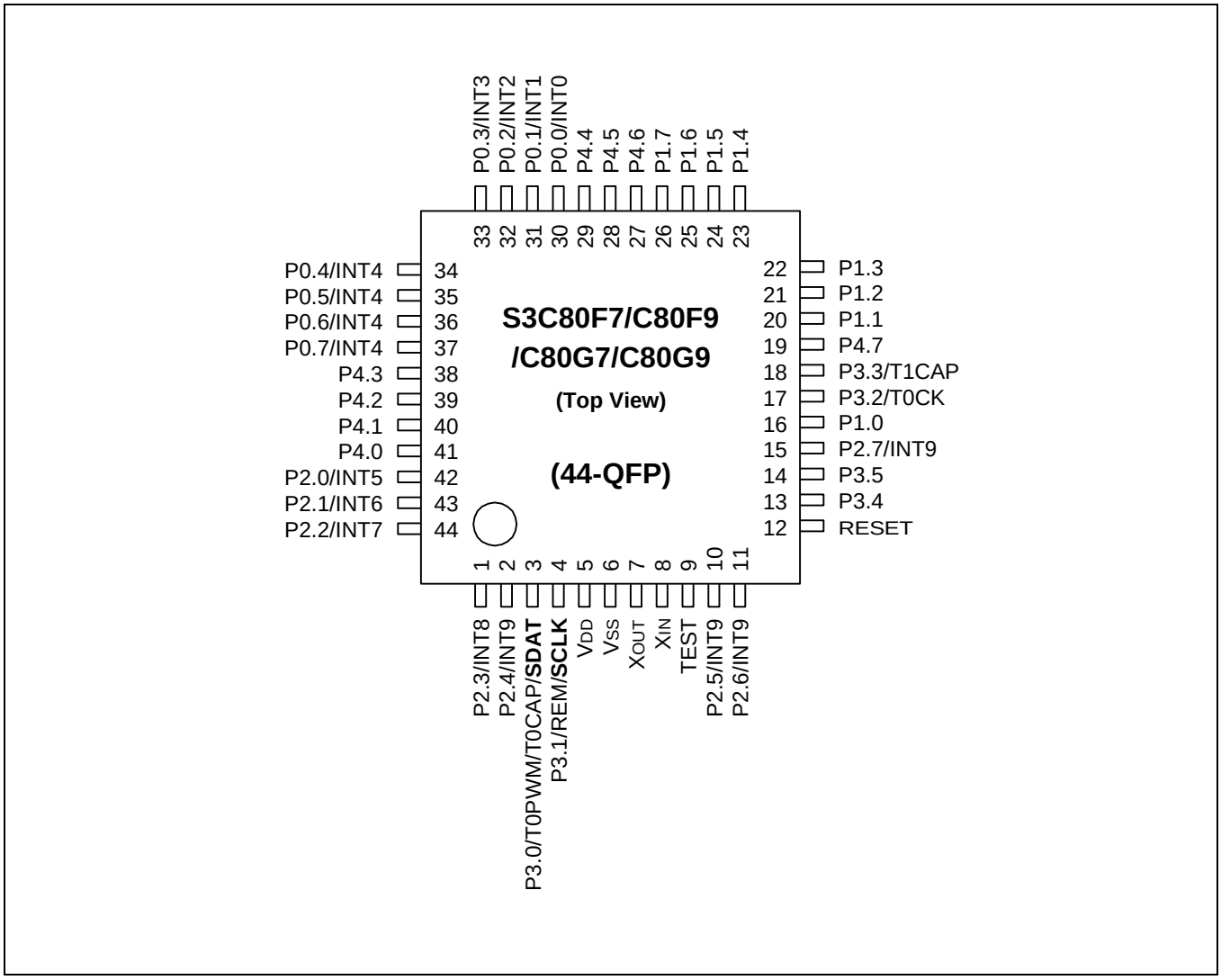


Figure 1-3. Pin Assignment Diagram (44-Pin QFP Package)

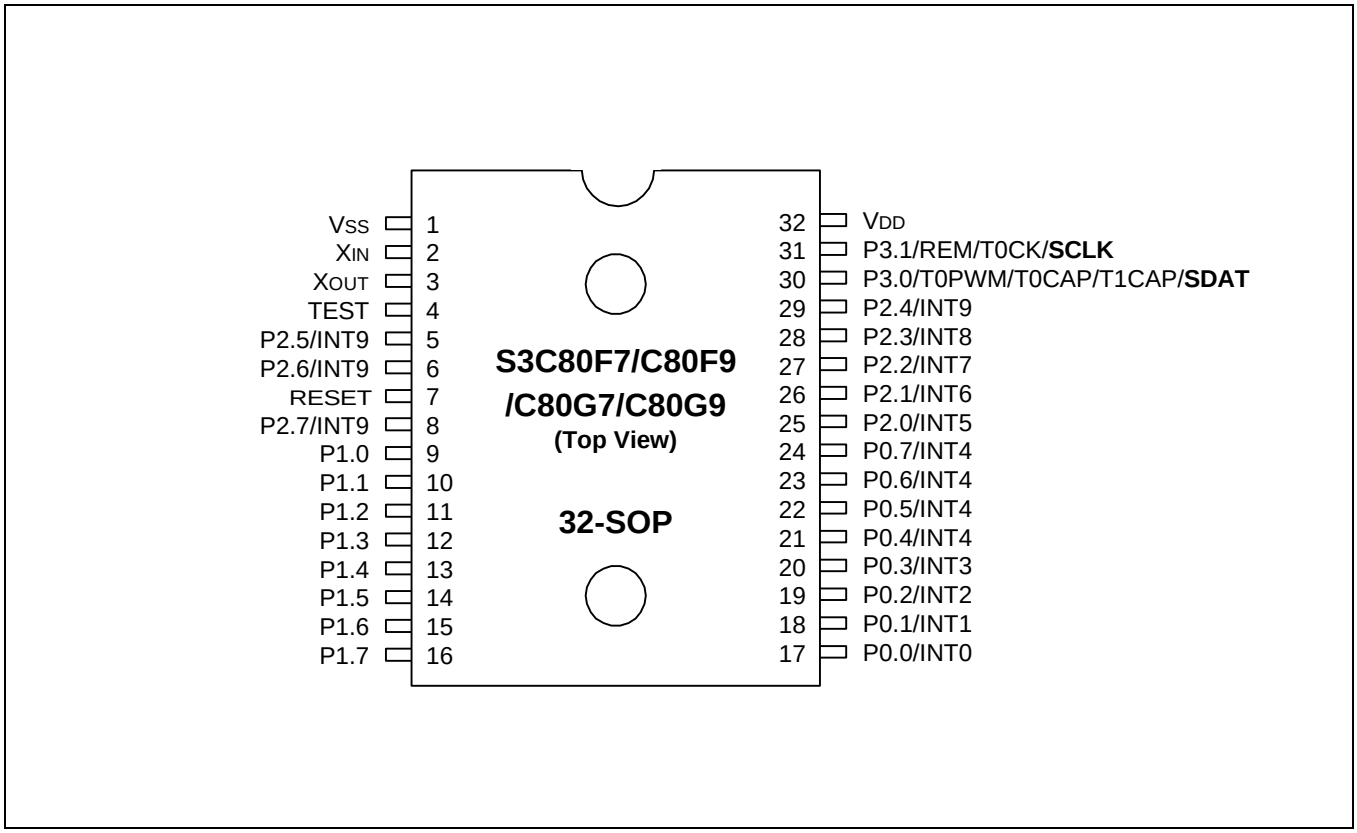


Figure 1-4. Pin Assignment Diagram (32-Pin SOP Package)

Table 1-1. Pin Descriptions of 44-QFP and 42-SDIP

Pin Names	Pin Type	Pin Description	Circuit Type	42 Pin No.	44 Pin No.	Shared Functions
P0.0–P0.7	I/O	I/O port with bit-programmable pins. Configurable to input or push-pull output mode. Pull-up resistors can be assigned by software. Pins can be assigned individually as external interrupt inputs with noise filters, interrupt enable/ disable, and interrupt pending control. SED & R circuit built in P0 for STOP releasing.	1	34–41	30–37	Ext. INT (INT0 - 4)
P1.0–P1.7	I/O	I/O port with bit-programmable pins. Configurable to input mode or output mode. Pin circuits are either push-pull or n-channel open-drain type.	2	20 24–30	16 20–26	–
P2.0–P2.3 P2.4–P2.7	I/O	I/O port with bit-programmable pins. Configurable to input or push-pull output mode. Pull-up resistors can be assigned by software. Pins can be assigned individually as external interrupt inputs with noise filters, interrupt enable/ disable, and interrupt pending control. SED & R circuit built in P2 for STOP releasing.	1	4–8, 16, 17 19	42–44 1,2, 10,11, 15	Ext. INT (INT5–9)
P3.0 P3.1	I/O	2-bit I/O port with bit-programmable pins. Configurable to input mode, push-pull output mode, or n-channel open-drain output mode. Input mode with pull-up resistors can be assigned by software. The two port 3 pins have high current drive capability	3 4	9–10	3–4	T0PWM/ T0CAP REM
P3.2–P3.3	I	C-MOS Input port with pull-up resistors	5	21 22	17 18	(T0CK) (T1CAP)
P3.4–P3.5	O	Open drain output port for high current drive	6	None	13–14	–
P4.0–P4.7	O	8- bit-programmable output pins. Configurable to open drain output port or push-pull output port.	7	1–3 42,23 31-33	41–38 27–29 19	–
X_{IN}, X_{OUT}	–	System clock input and output pins	–	13,14	7,8	–
RESET	I	System reset signal input pin and back-up mode input.	8	18	12	–
TEST	I	Test signal input pin (for factory use only; must be connected to V_{SS}.)	–	15	9	–
V_{DD}	–	Power supply input pin	–	11	5	–
V_{SS}	–	Ground pin	–	12	6	–

Table 1-2. Pin Descriptions of 32-SOP

Pin Names	Pin Type	Pin Description	Circuit Type	32 Pin No.	Shared Functions
P0.0–P0.7	I/O	I/O port with bit-programmable pins. Configurable to input or push-pull output mode. Pull-up resistors are assignable by software. Pins can be assigned individually as external interrupt inputs with noise filters, interrupt enable/ disable, and interrupt pending control. SED & R circuit built in P0 for STOP releasing.	1	17–24	Ext. INT
P1.0–P1.7	I/O	I/O port with bit-programmable pins. Configurable to input mode or output mode. Pin circuits are either push-pull or n-channel open-drain type.	2	9–16	–
P2.0–P2.3 P2.4–P2.7	I/O	I/O port with bit-programmable pins. Configurable to input or push-pull output mode. Pull-up resistors can be assigned by software. Pins can be assigned individually as external interrupt inputs with noise filters, interrupt enable/disable, and interrupt pending control. SED & R circuit built in P2 for STOP releasing.	1	25–28 29,5, 6,8	Ext. INT
P3.0 P3.1	I/O	2-bit I/O port with bit-programmable pins. Configurable to input mode, push-pull output mode, or n-channel open-drain output mode. Input mode with pull-up resistors can be assigned by software. The two port 3 pins have high current drive capability.	3 4	30,31	T0PWM/ T0CAP/T1CAP REM/T0CK
X_{IN}, X_{OUT}	–	System clock input and output pins	–	2,3	–
RESET	I	System reset signal input pin and back-up mode input.	8	7	–
TEST	I	Test signal input pin (for factory use only; must be connected to V_{SS}).	–	4	–
V_{DD}	–	Power supply input pin	–	32	–
V_{SS}	–	Ground pin	–	1	–

PIN CIRCUITS

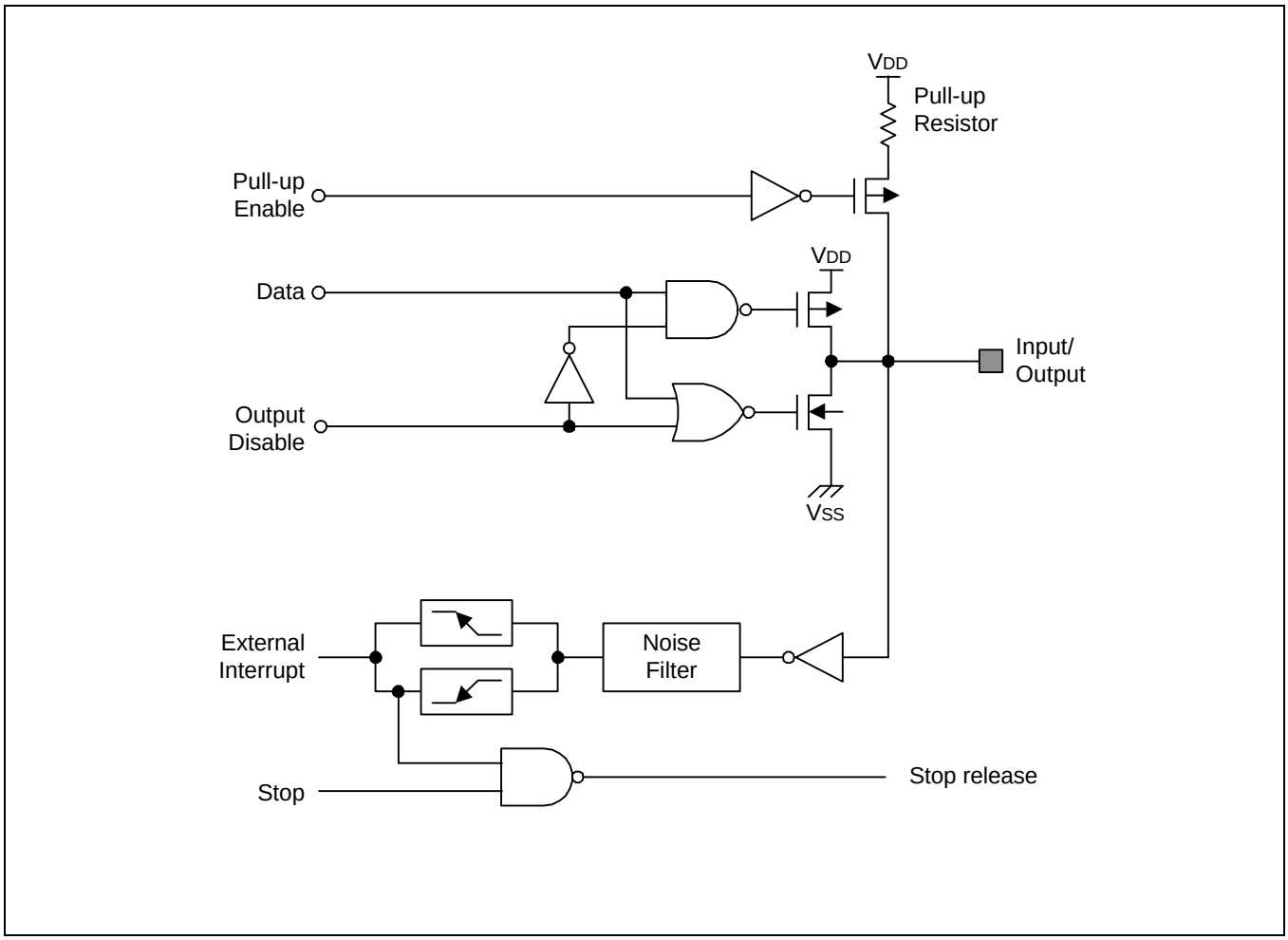


Figure 1-5. Pin Circuit Type 1 (Port 0 and Port2)

PIN CIRCUITS (Continued)

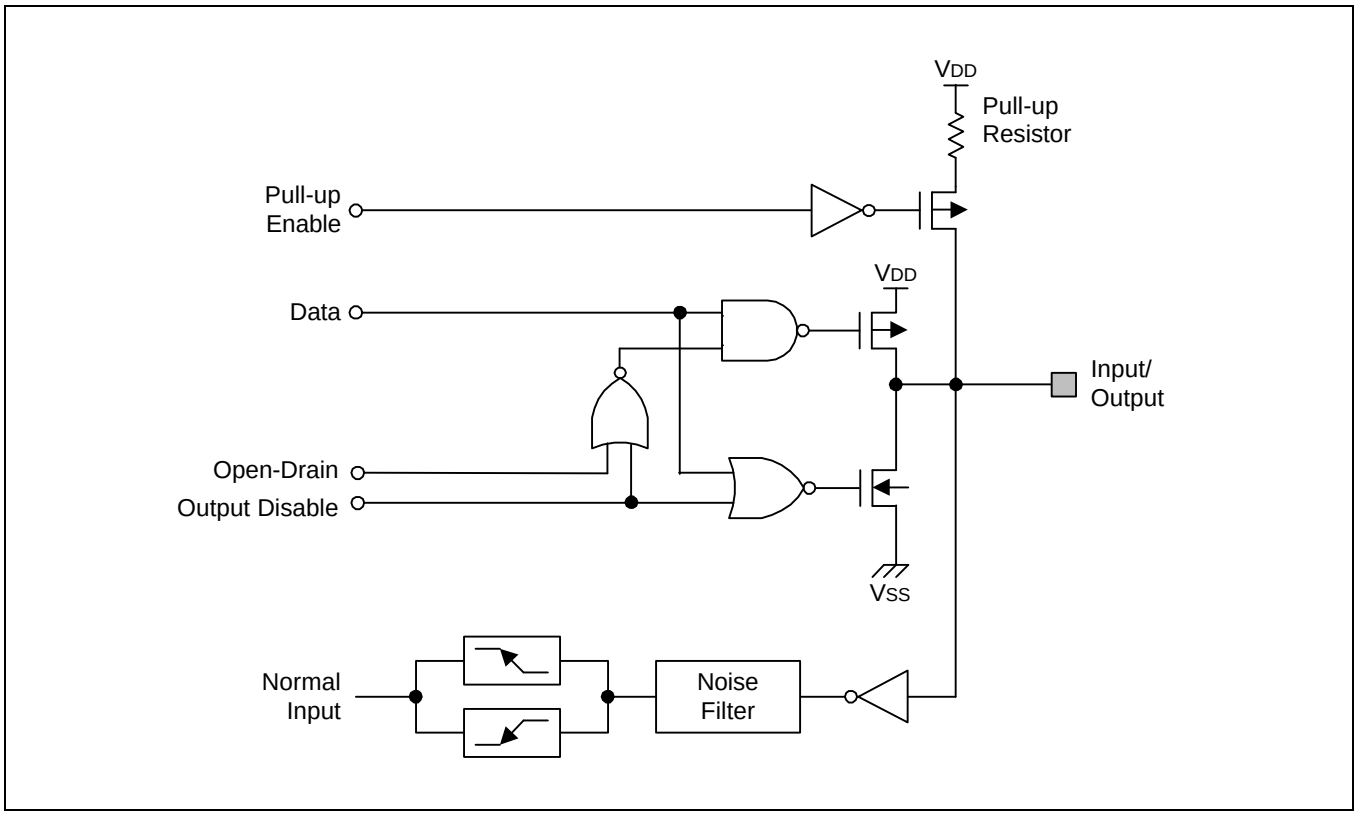


Figure 1-6. Pin Circuit Type 2 (Port 1)

PIN CIRCUITS (Continued)

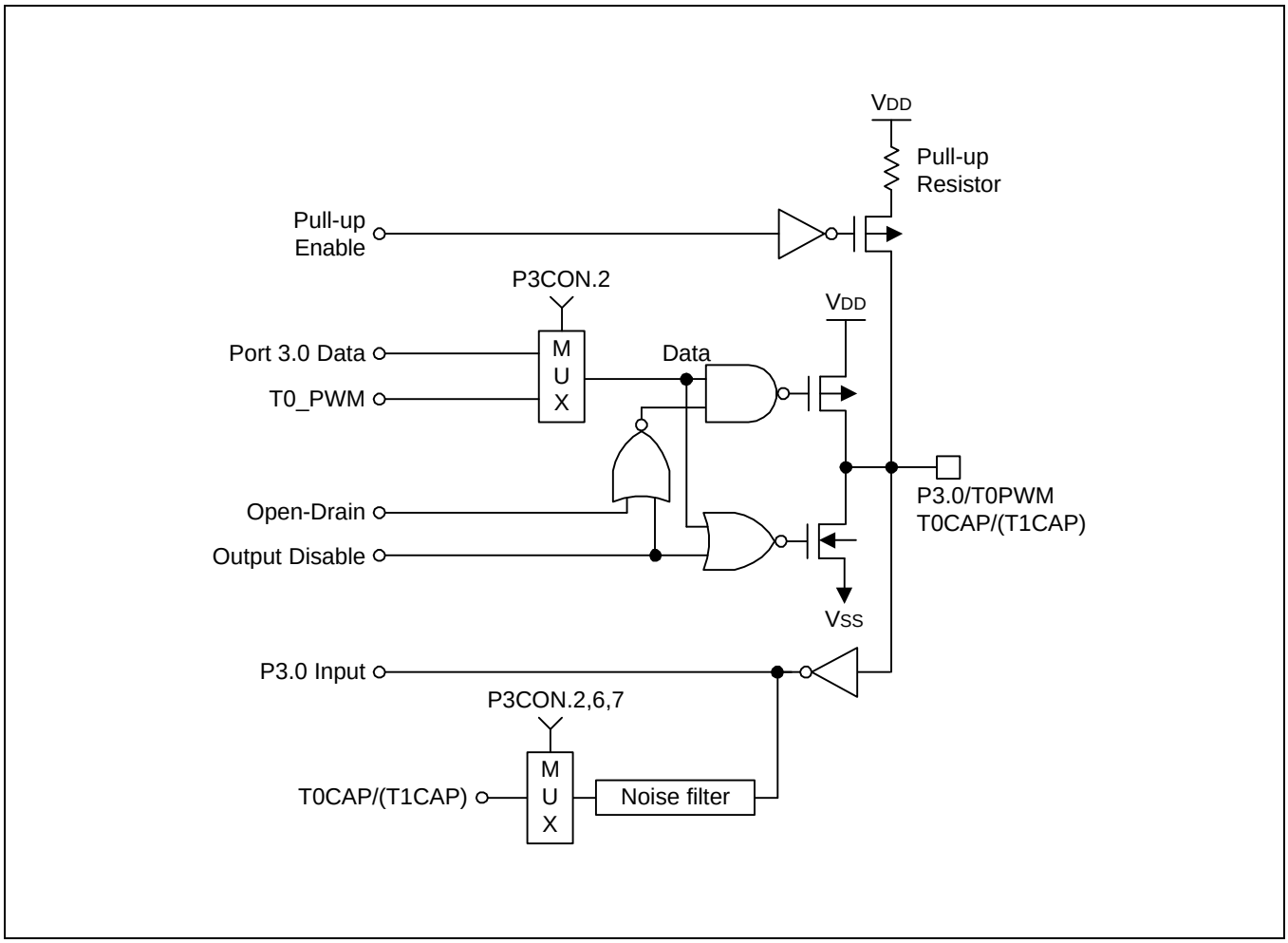


Figure 1-7. Pin Circuit Type 3 (P3.0)

PIN CIRCUITS (Continued)

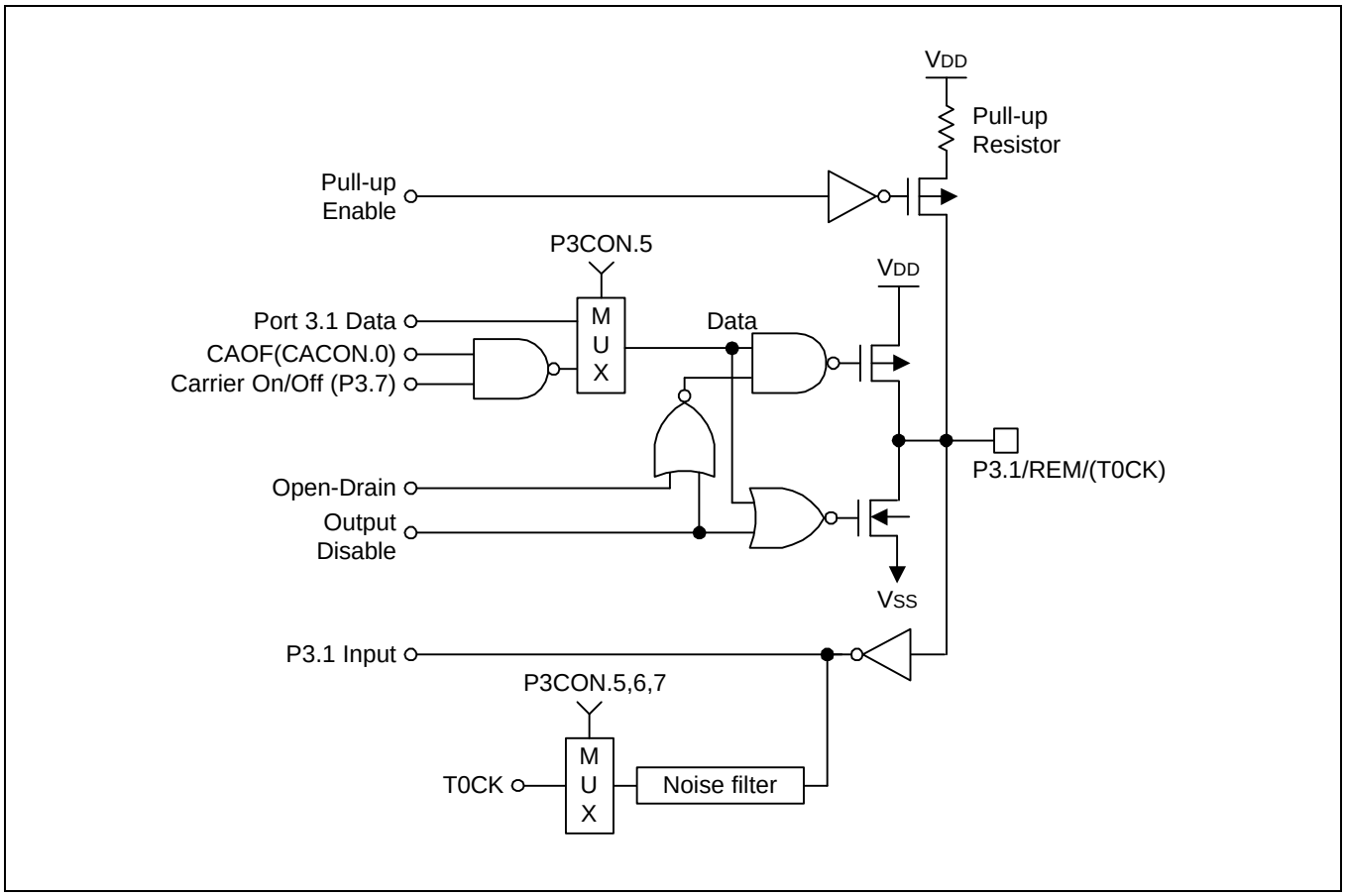


Figure 1-8. Pin Circuit Type 4 (P3.1) Circuit

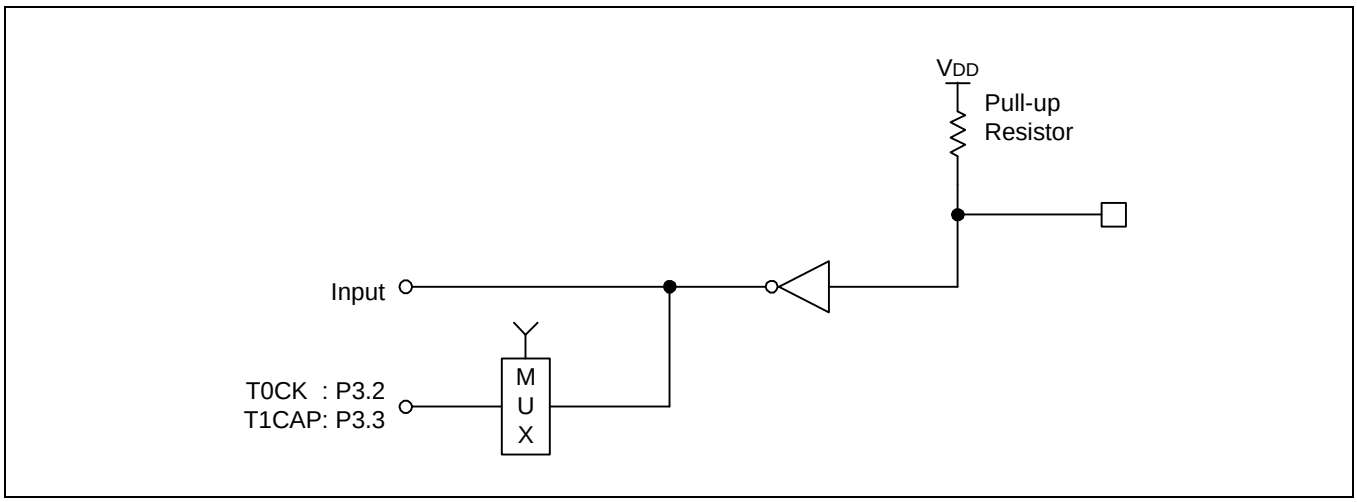


Figure 1-9. Pin Circuit Type 5 (P3.2, P3.3)

PIN CIRCUITS (Continued)

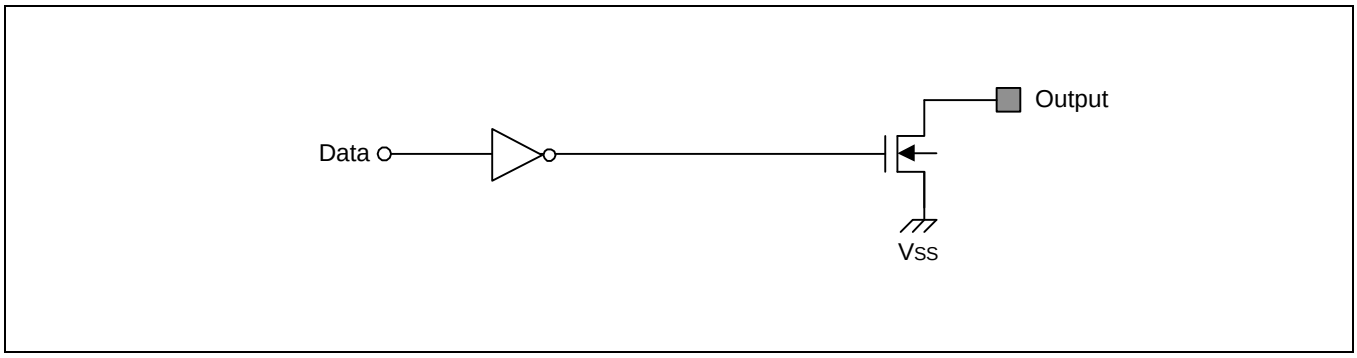


Figure 1-10. Pin Circuit type 6 (P3.4, P3.5)

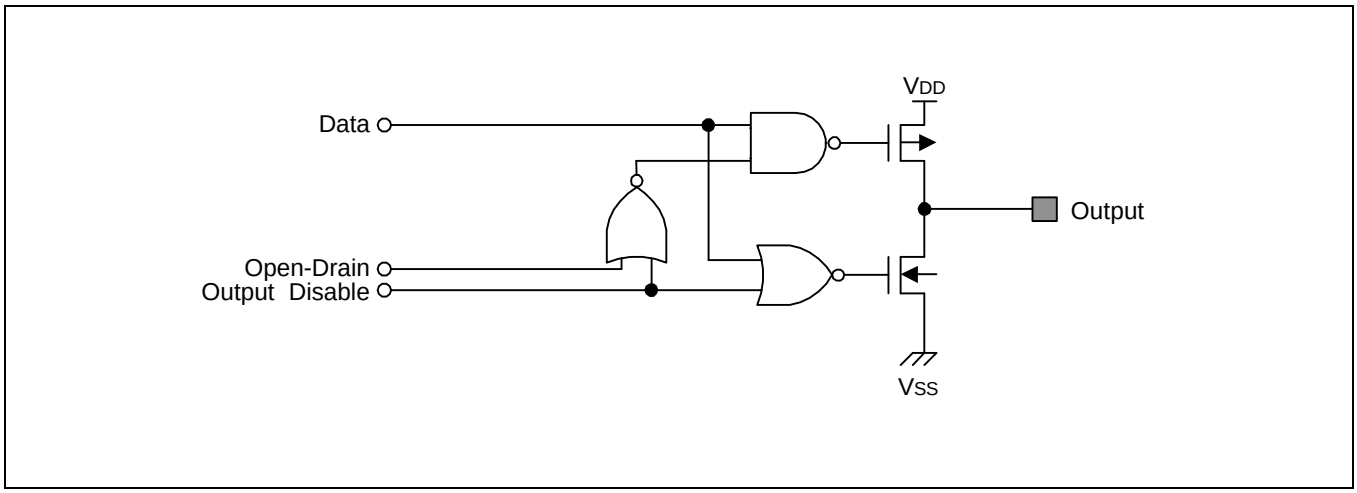


Figure 1-11. Pin Circuit type 7 (Port 4)

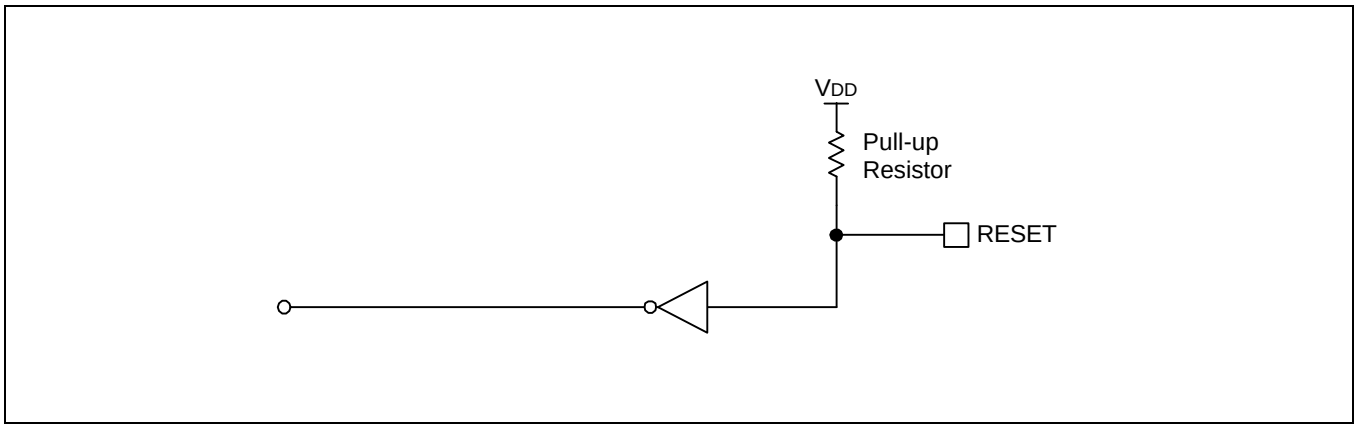


Figure 1-12. Pin Circuit type 8 (RESET)

14 ELECTRICAL DATA 1 (S3C80F7/C80F9)

OVERVIEW

In this section, S3C80F7/C80F9 electrical characteristics are presented in tables and graphs. The information is arranged in the following order:

— Absolute maximum ratings
— D.C. electrical characteristics
— Data retention supply voltage in Stop mode
— Stop mode release timing when initiated by an external interrupt
— Stop mode release timing when initiated by a Reset
— I/O capacitance
— A.C. electrical characteristics
— Input timing for external interrupts
— Input timing for RESET
— Oscillation characteristics
— Oscillation stabilization time

Table 14-1. Absolute Maximum Ratings

(T_A = 25 °C)

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V_{DD}	–	– 0.3 to + 6.5	V
Input voltage	V_{IN}	–	– 0.3 to V_{DD} + 0.3	V
Output voltage	V_O	All output pins	– 0.3 to V_{DD} + 0.3	V
Output current High	I_{OH}	One I/O pin active	– 18	mA
		All I/O pins active	– 60	
Output current Low	I_{OL}	One I/O pin active	+ 30	mA
		Total pin current for ports 0, 1, and 2	+ 100	
		Total pin current for port 3	+ 40	
Operating temperature	T_A	–	– 40 to + 85	°C
Storage temperature	T_{STG}	–	– 65 to + 150	°C

Table 14-2. D.C. Electrical Characteristics

(T_A = – 40 °C to + 85 °C, V_{DD} = 2.0 V to 5.0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Voltage	V_{DD}	F_{OSC} = 8 MHz (Instruction clock = 2 MHz)	2.0	–	5.0	V
Input High voltage	V_{IH1}	All input pins except V_{IH2} and V_{IH3}	0.8 V_{DD}	–	V_{DD}	V
	V_{IH2}	RESET	0.85 V_{DD}		V_{DD}	
	V_{IH3}	XIN	V_{DD} – 0.3		V_{DD}	
Input Low voltage	V_{IL1}	All input pins except V_{IL2} and V_{IL3}	0	–	0.2 V_{DD}	V
	V_{IL2}	RESET			0.2 V_{DD}	
	V_{IL3}	XIN			0.3	
Output High voltage	V_{OH1}	V_{DD} = 2.4 V I_{OH} = – 6 mA Port 3.1 only, TA = 25°C	V_{DD} – 0.7			V
	V_{OH2}	V_{DD} = 2.4 V, I_{OH} = – 2.2mA P3.0, P2.0–2.3 T_A = 25°C	V_{DD} – 0.7			

Table 14-2. D.C. Electrical Characteristics (Continued)

(T_A = – 40 °C to + 85 °C, V_{DD} = 2.0 V to 5.0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output High voltage	V_{OH3}	V_{DD} = 2.4 V,I_{OH} = – 1 mA Port0, Port1, P2.4-2.7 and Port4 T_A = 25°C	V_{DD} – 1.0	–	–	V
Output Low voltage	V_{OL1}	V_{DD} = 2.4 V, I_{OL} = 12 mA, port 3.1 only, T_A = 25°C	–	0.4	0.5	V
	V_{OL2}	V_{DD} = 2.4 V, I_{OL} = 5 mA P3.0, P3.4-3.5, P2.0-2.3 T_A = 25°C		0.4	0.5	
	V_{OL3}	I_{OL} = 2mA Port 0, Port1, P2.4-2.7 and Port4 T_A = 25°C		0.4	1	
Input High leakage current	I_{LIH1}	V_{IN} = V_{DD} All input pins except X_{IN} and X_{OUT}	–	–	1	µA
	I_{LIH2}	V_{IN} = V_{DD}, X_{IN} and X_{OUT}			20	
Input Low leakage current	I_{LIL1}	V_{IN} = 0 V All input pins except X_{IN}, X_{OUT}, and RESET	–	–	– 1	µA
	I_{LIL2}	V_{IN} = 0 V X_{IN} and X_{OUT}			– 20	
Output High leakage current	I_{LOH}	V_{OUT} = V_{DD} All output pins	–	–	1	µA
Output Low leakage current	I_{LOL}	V_{OUT} = 0 V All output pins	–	–	– 1	µA
Pull-up resistors	R_{L1}	V_{IN} = 0 V, V_{DD} = 2.4 V T_A = 25°C, Ports 0–2, P3.2–3.3	44	55	95	kΩ

Table 14-2. D.C. Electrical Characteristics (Continued)

(T_A = – 40 °C to + 85 °C, V_{DD} = 2.0 V to 5.0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply current (note)	I_{DD1}	Operating mode V_{DD} = 5.0 V 8 MHz crystal	–	6	11	mA
		4 MHz crystal		4.5	9	
	I_{DD2}	Idle mode V_{DD} = 5.0 V 8 MHz crystal		1.8	3.5	
		4 MHz crystal		1.6	3.0	
	I_{DD3}	Stop mode; V_{DD} = 5.0 V	–	18	25	uA
		V_{DD} = 3.6 V		12	15	
		V_{DD} = 2.4 V		4.5	8	
		V_{DD} = 0.7 V		1	1.5	

NOTE: Supply current does not include current drawn through internal pull-up resistors or external output current loads.

Table 14-3. Characteristics of Low Voltage Detect circuit

(T_A = – 40 °C to + 85 °C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Hysteresys Voltage of LVD (Slew Rate of LVD)	ΔV	–	–	100	300	mV
Low level detect voltage	V_{LVD}	–	2.00	2.20	2.40	V

Table 14-4. Data Retention Supply Voltage in Stop Mode

(T_A = – 40 °C to + 85 °C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Data retention supply voltage	V_{DDDR}	–	1.0	–	5.0	V
Data retention supply current	I_{DDDR}	V_{DDDR} = 1.0 V Stop mode	–	–	1	µA

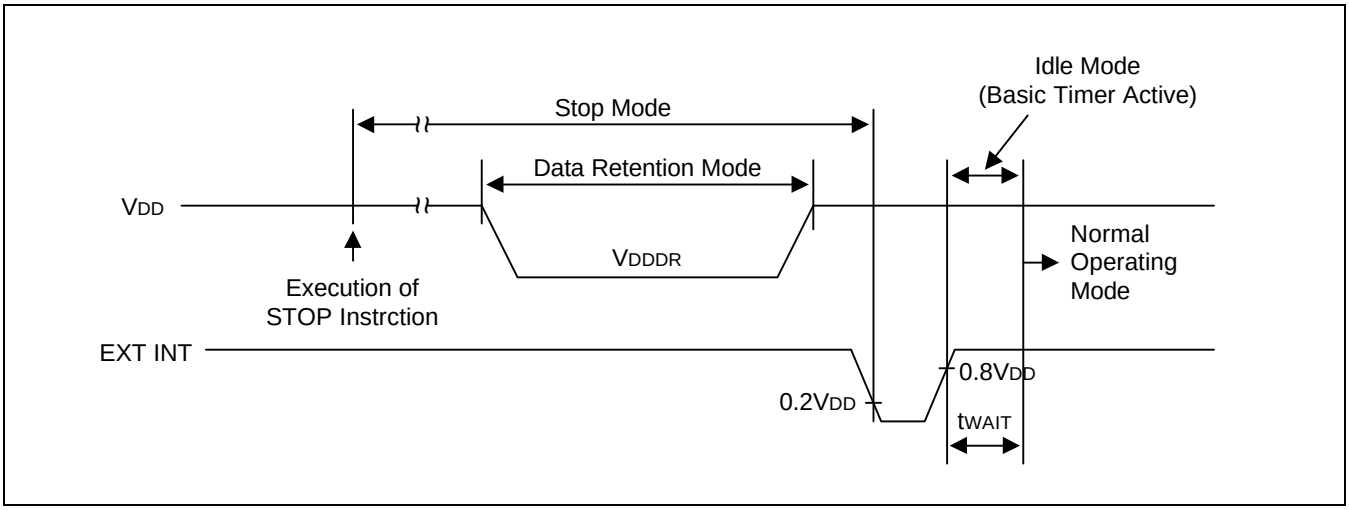
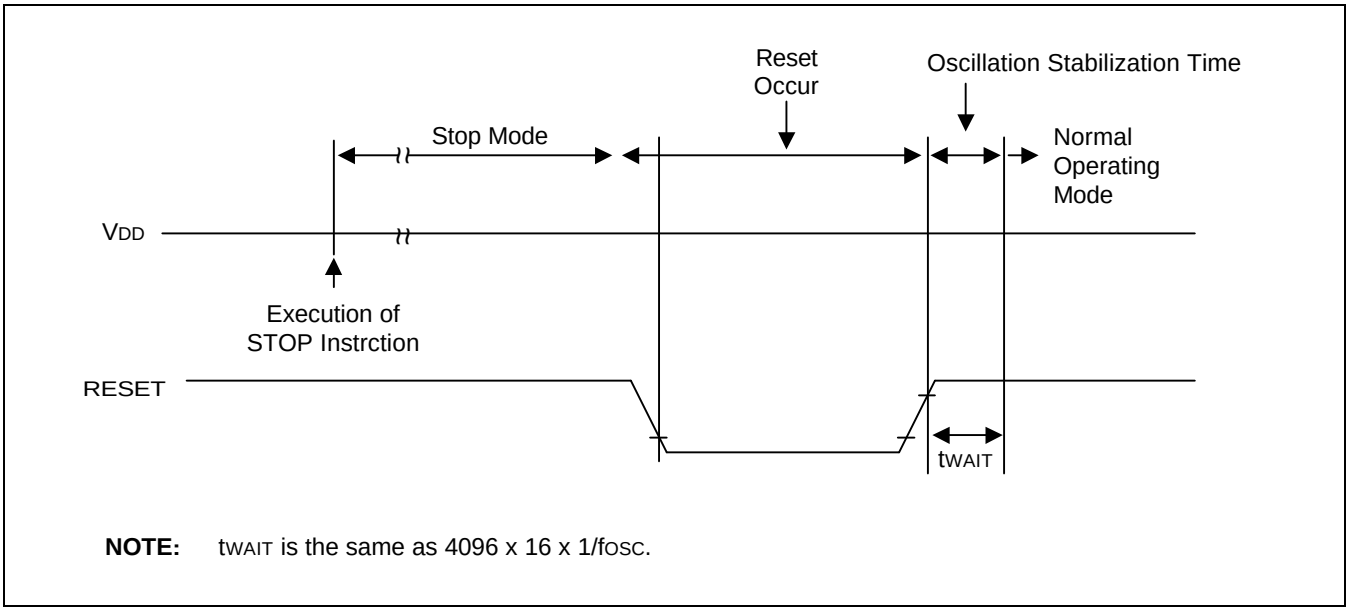
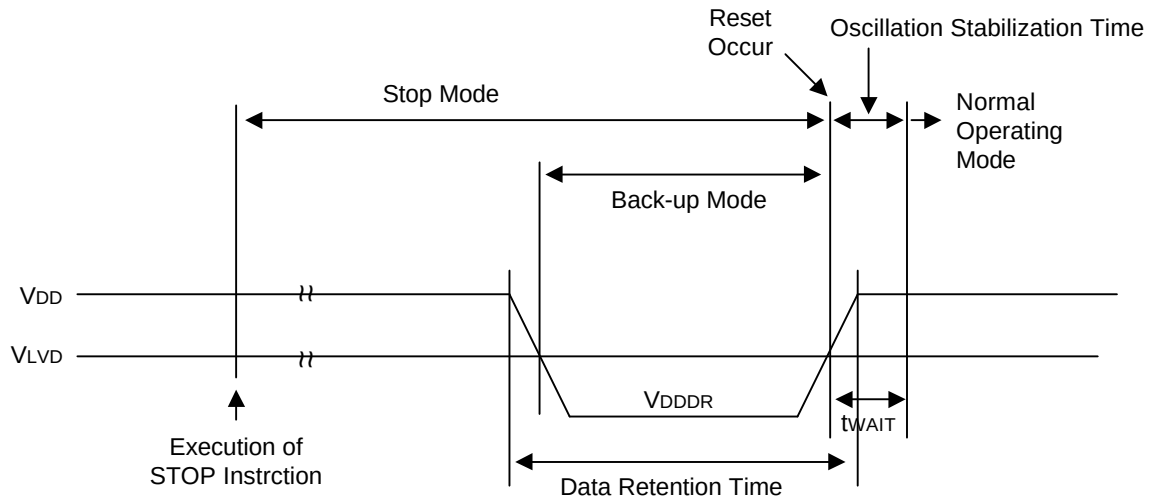


Figure 14-1. Stop Mode Release Timing When Initiated by an External Interrupt



NOTE: tWAIT is the same as 4096 x 16 x 1/fOSC.

Figure 14-2. Stop Mode Release Timing When Initiated by a RESET



NOTE: tWAIT is the same as 4096 x 16 x 1/fOSC.

Figure 14-3. Stop Mode Release Timing When Initiated by a LVD

Table 14-5. Input/Output Capacitance

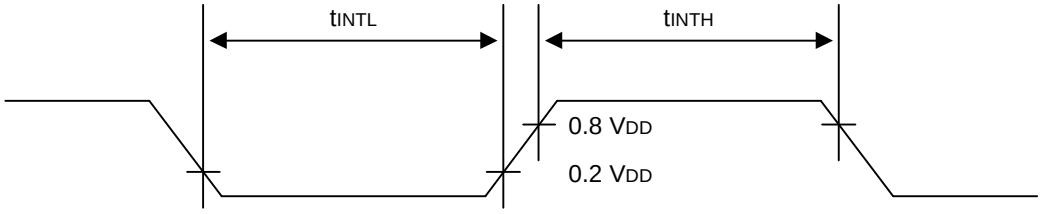
(T_A = – 40 °C to + 85 °C , V_{DD} = 0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C_{IN}	f = 1 MHz; unmeasured pins are connected to V_{SS}	–	–	10	pF
Output capacitance	C_{OUT}					
I/O capacitance	C_{IO}					

Table 14-6. A.C. Electrical Characteristics

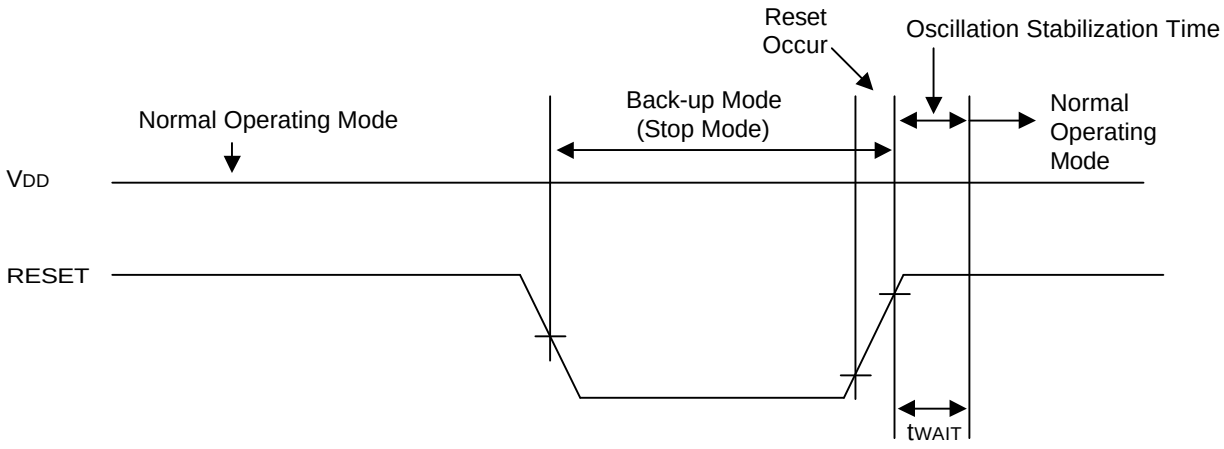
(T_A = – 40 °C to + 85 °C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Interrupt input, High, Low width	t_{INTH}, t_{INTL}	P0.0–P0.7, P2.3–P2.0 V_{DD} = 5.0 V	200	300	–	ns
RESET input Low width	t_{RSL}	Input V_{DD} = 5.0 V	1000	–	–	



NOTE: The unit tCPU means one CPU clock period.

Figure 14-4. Input Timing for External Interrupts (Port 0, P2.3–P2.0)



NOTE: tWAIT is the same as 4096 x 16 x 1/fOSC.

Figure 14-5. Input Timing for RESET

Table 14-7. Oscillation Characteristics

(T_A = – 40 °C + 85 °C)

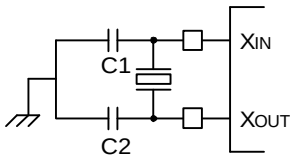
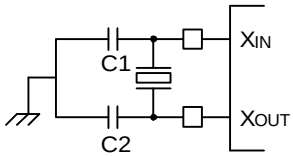
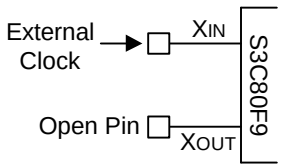
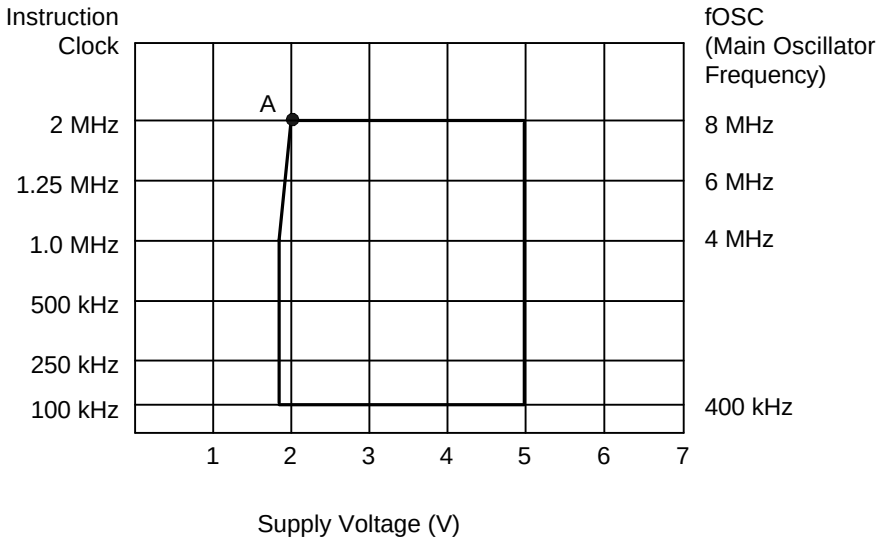
Oscillator	Clock Circuit	Conditions	Min	Typ	Max	Unit
Crystal		CPU clock oscillation frequency	1	–	8	MHz
Ceramic		CPU clock oscillation frequency	1	–	8	MHz
External clock		X_{IN} input frequency	1	–	8	MHz

Table 14-8. Oscillation Stabilization Time

(T_A = – 40 °C + 85 °C, V_{DD} = 4.5 V to 5.0 V)

Oscillator	Test Condition	Min	Typ	Max	Unit
Main crystal	f_{OSC} > 400 kHz	–	–	20	ms
Main ceramic	Oscillation stabilization occurs when V_{DD} is equal to the minimum oscillator voltage range.	–	–	10	ms
External clock (main system)	X_{IN} input High and Low width (t_{XH}, t_{XL})	25	–	500	ns
Oscillator stabilization wait time	t_{WAIT} when released by a reset (1)	–	$2^{16}/f_{OSC}$	–	ms
	t_{WAIT} when released by an interrupt (2)	–	–	–	ms

NOTES:
1. f_{OSC} is the oscillator frequency.
2. The duration of the oscillation stabilization time (t_{WAIT}) when it is released by an interrupt is determined by the setting in the basic timer control register, BTCON.



Instruction Clock = 1/6n x oscillator frequency (n = 1, 2, 8, or 16)
A: 2.0 V, 8 MHz

Figure 14-6. Operating Voltage Range of S3C80F9

15 ELECTRICAL DATA 2 (S3C80G7/C80G9)

OVERVIEW

In this section, S3C80G7/C80G9 electrical characteristics are presented in tables and graphs. The information is arranged in the following order:

— Absolute maximum ratings
— D.C. electrical characteristics
— Data retention supply voltage in Stop mode
— Stop mode release timing when initiated by an external interrupt
— Stop mode release timing when initiated by a Reset
— I/O capacitance
— A.C. electrical characteristics
— Input timing for external interrupts
— Input timing for RESET
— Oscillation characteristics
— Oscillation stabilization time

Table 15-1. Absolute Maximum Ratings

(T_A = 25 °C)

Parameter	Symbol	Conditions	Rating	Unit
Supply voltage	V_{DD}	–	– 0.3 to + 6.5	V
Input voltage	V_{IN}	–	– 0.3 to V_{DD} + 0.3	V
Output voltage	V_O	All output pins	– 0.3 to V_{DD} + 0.3	V
Output current High	I_{OH}	One I/O pin active	– 18	mA
		All I/O pins active	– 60	
Output current Low	I_{OL}	One I/O pin active	+ 30	mA
		Total pin current for ports 0, 1, and 2	+ 100	
		Total pin current for port 3	+ 40	
Operating temperature	T_A	–	– 40 to + 85	°C
Storage temperature	T_{STG}	–	– 65 to + 150	°C

Table 15-2. D.C. Electrical Characteristics

(T_A = – 40 °C to + 85 °C, V_{DD} = 2.0 V to 5.0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Voltage	V_{DD}	F_{OSC} = 4 MHz (Instruction clock = 1 MHz)	1.7	–	5.0	V
Input High voltage	V_{IH1}	All input pins except V_{IH2} and V_{IH3}	0.8 V_{DD}	–	V_{DD}	V
	V_{IH2}	RESET	0.85 V_{DD}		V_{DD}	
	V_{IH3}	XIN	V_{DD} – 0.3		V_{DD}	
Input Low voltage	V_{IL1}	All input pins except V_{IL2} and V_{IL3}	0	–	0.2 V_{DD}	V
	V_{IL2}	RESET			0.2 V_{DD}	
	V_{IL3}	XIN			0.3	
Output High voltage	V_{OH1}	V_{DD} = 2.4 V I_{OH} = – 6 mA Port 3.1 only, TA = 25°C	V_{DD} – 0.7			V
	V_{OH2}	V_{DD} = 2.4 V, I_{OH} = – 2.2mA P3.0, P2.0–2.3 T_A = 25°C	V_{DD}– 0.7			

Table 15-2. D.C. Electrical Characteristics (Continued)

(T_A = – 40 °C to + 85 °C, V_{DD} = 2.0 V to 5.0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output High voltage	V_{OH3}	V_{DD} = 2.4 V,I_{OH} = – 1 mA Port0, Port1, P2.4–2.7 and Port4 T_A = 25°C	V_{DD} – 1.0	–	–	V
Output Low voltage	V_{OL1}	V_{DD} = 2.4 V, I_{OL} = 12 mA, port 3.1 only, T_A = 25°C	–	0.4	0.5	V
	V_{OL2}	V_{DD} = 2.4 V, I_{OL} = 5 mA P3.0, P3.4–3.5, P2.0–2.3 T_A = 25°C		0.4	0.5	
	V_{OL3}	I_{OL} = 2mA Port 0, Port1, P2.4–2.7 and Port4 T_A = 25°C		0.4	1	
Input High leakage current	I_{LIH1}	V_{IN} = V_{DD} All input pins except X_{IN} and X_{OUT}	–	–	1	µA
	I_{LIH2}	V_{IN} = V_{DD}, X_{IN} and X_{OUT}			20	
Input Low leakage current	I_{LIL1}	V_{IN} = 0 V All input pins except X_{IN}, X_{OUT}, and RESET	–	–	– 1	µA
	I_{LIL2}	V_{IN} = 0 V X_{IN} and X_{OUT}			– 20	
Output High leakage current	I_{LOH}	V_{OUT} = V_{DD} All output pins	–	–	1	µA
Output Low leakage current	I_{LOL}	V_{OUT} = 0 V All output pins	–	–	– 1	µA
Pull-up resistors	R_{L1}	V_{IN} = 0 V, V_{DD} = 2.4 V T_A = 25°C, Ports 0–2, P3.2–3.3	44	55	95	kΩ

Table 15-2. D.C. Electrical Characteristics (Continued)

(T_A = – 40 °C to + 85 °C, V_{DD} = 2.0 V to 5.0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply current (note)	I_{DD1}	Operating mode V_{DD} = 5.0 V 4 MHz crystal	–	4.5	9	mA
	I_{DD2}	Idle mode V_{DD} = 5.0 V 4 MHz crystal		1.6	3.0	
	I_{DD3}	Stop mode; V_{DD} = 5.0 V	–	1	6	uA

NOTE: Supply current does not include current drawn through internal pull-up resistors or external output current loads.

Table 15-3. Characteristics of Low Voltage Detect circuit

(T_A = – 40 °C to + 85 °C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Hysteresys Voltage of LVD (Slew Rate of LVD)	ΔV	–	–	100	300	mV
Low level detect voltage	V_{LVD}	–	1.70	1.90	2.10	V

Table 15-4. Data Retention Supply Voltage in Stop Mode

(T_A = – 40 °C to + 85 °C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Data retention supply voltage	V_{DDDR}	–	1.0	–	5.0	V
Data retention supply current	I_{DDDR}	V_{DDDR} = 1.0 V Stop mode	–	–	1	µA

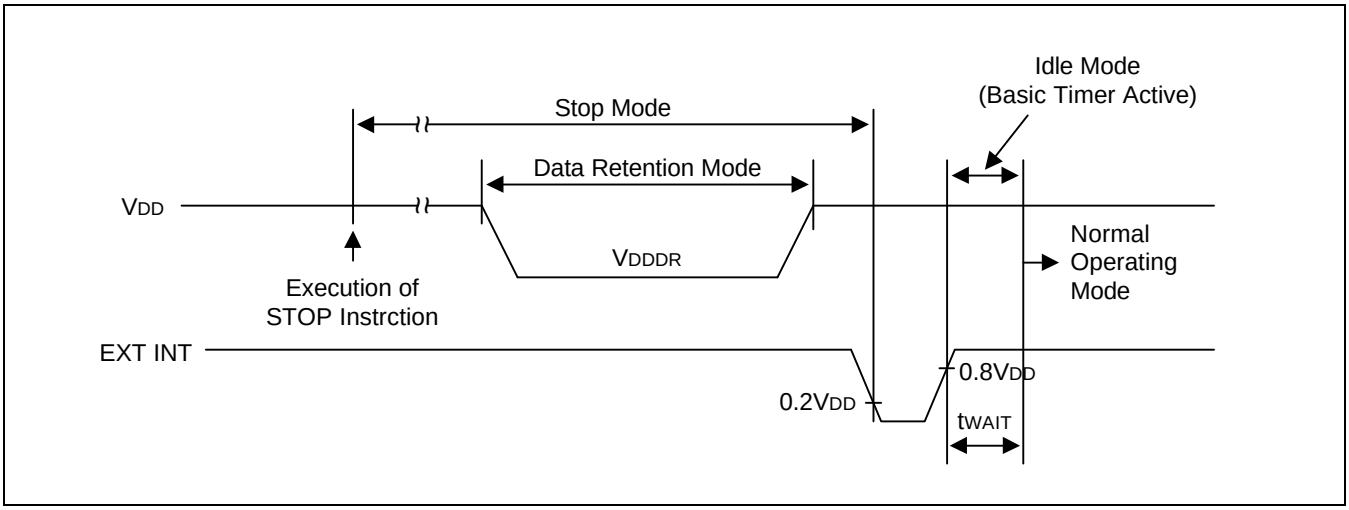
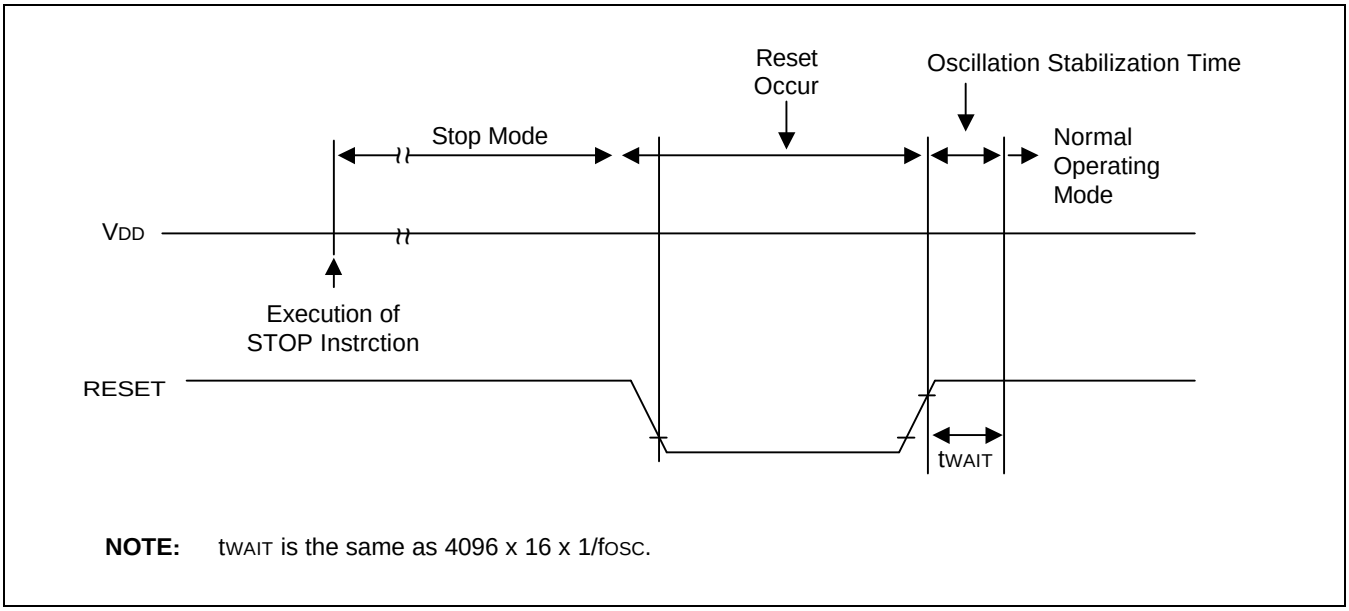


Figure 15-1. Stop Mode Release Timing When Initiated by an External Interrupt



NOTE: tWAIT is the same as 4096 x 16 x 1/fOSC.

Figure 15-2. Stop Mode Release Timing When Initiated by a RESET

Table 15-5. Input/Output Capacitance

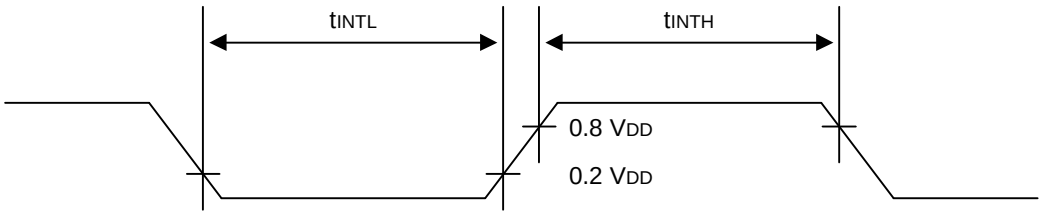
(T_A = – 40 °C to + 85 °C , V_{DD} = 0 V)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C_{IN}	f = 1 MHz; unmeasured pins are connected to V_{SS}	–	–	10	pF
Output capacitance	C_{OUT}					
I/O capacitance	C_{IO}					

Table 15-6. A.C. Electrical Characteristics

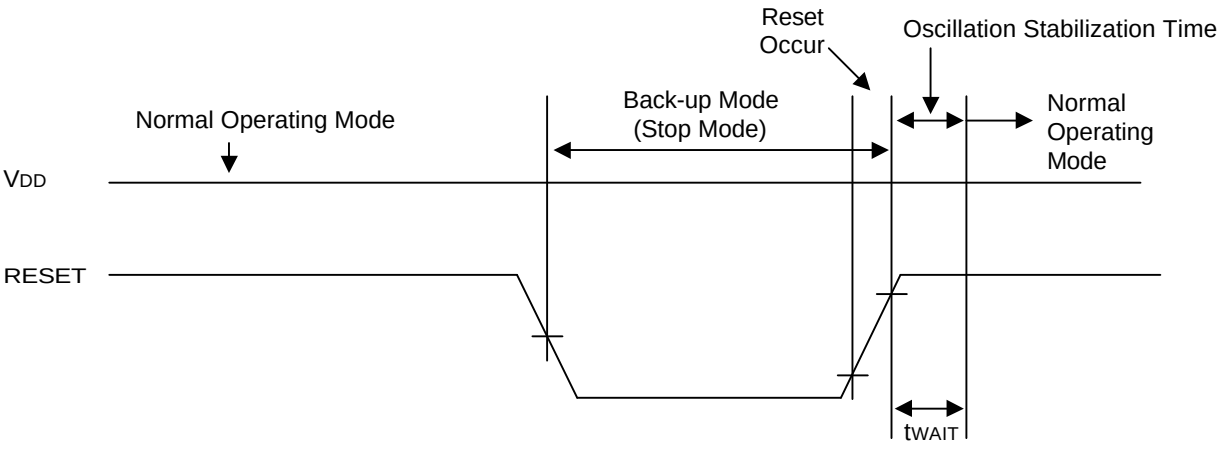
(T_A = – 40 °C to + 85 °C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Interrupt input, High, Low width	t_{INTH}, t_{INTL}	P0.0–P0.7, P2.3–P2.0 V_{DD} = 5.0 V	200	300	–	ns
RESET input Low width	t_{RSL}	Input V_{DD} = 5.0 V	1000	–	–	



NOTE: The unit tCPU means one CPU clock period.

Figure 15-3. Input Timing for External Interrupts (Port 0, P2.3–P2.0)



NOTE: tWAIT is the same as 4096 x 16 x 1/fOSC.

Figure 15-4. Input Timing for RESET

Table 15-7. Oscillation Characteristics

(T_A = – 40 °C + 85 °C)

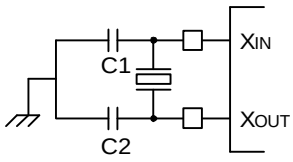
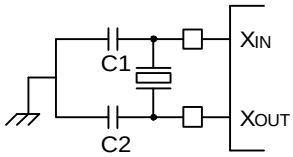
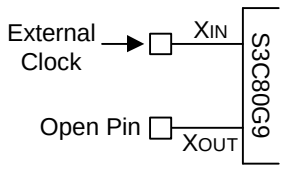
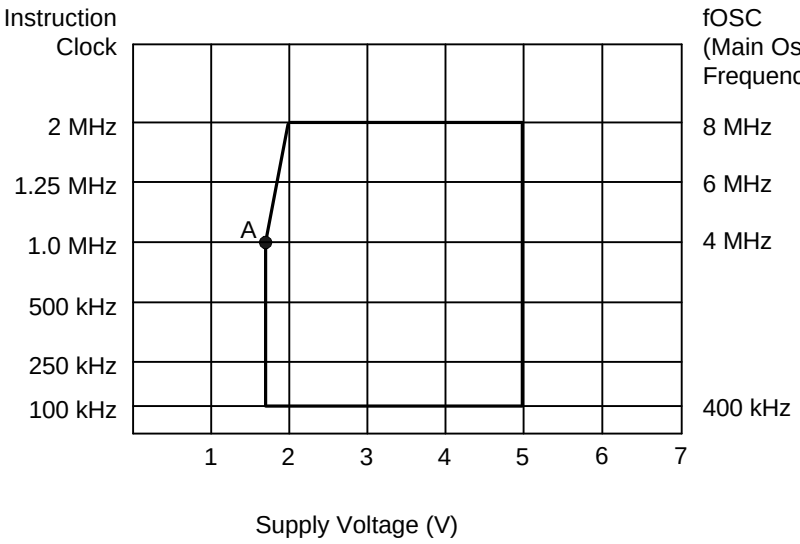
Oscillator	Clock Circuit	Conditions	Min	Typ	Max	Unit
Crystal		CPU clock oscillation frequency	1	–	4	MHz
Ceramic		CPU clock oscillation frequency	1	–	4	MHz
External clock		X_{IN} input frequency	1	–	4	MHz

Table 15-8. Oscillation Stabilization Time

(T_A = – 40 °C + 85 °C, V_{DD} = 4.5 V to 5.0 V)

Oscillator	Test Condition	Min	Typ	Max	Unit
Main crystal	f_{OSC} > 400 kHz	–	–	20	ms
Main ceramic	Oscillation stabilization occurs when V_{DD} is equal to the minimum oscillator voltage range.	–	–	10	ms
External clock (main system)	X_{IN} input High and Low width (t_{XH}, t_{XL})	25	–	500	ns
Oscillator stabilization wait time	t_{WAIT} when released by a reset (1)	–	$2^{16}/f_{OSC}$	–	ms
	t_{WAIT} when released by an interrupt (2)	–	–	–	ms

NOTES:
1. f_{OSC} is the oscillator frequency.
2. The duration of the oscillation stabilization time (t_{WAIT}) when it is released by an interrupt is determined by the setting in the basic timer control register, BTCON.



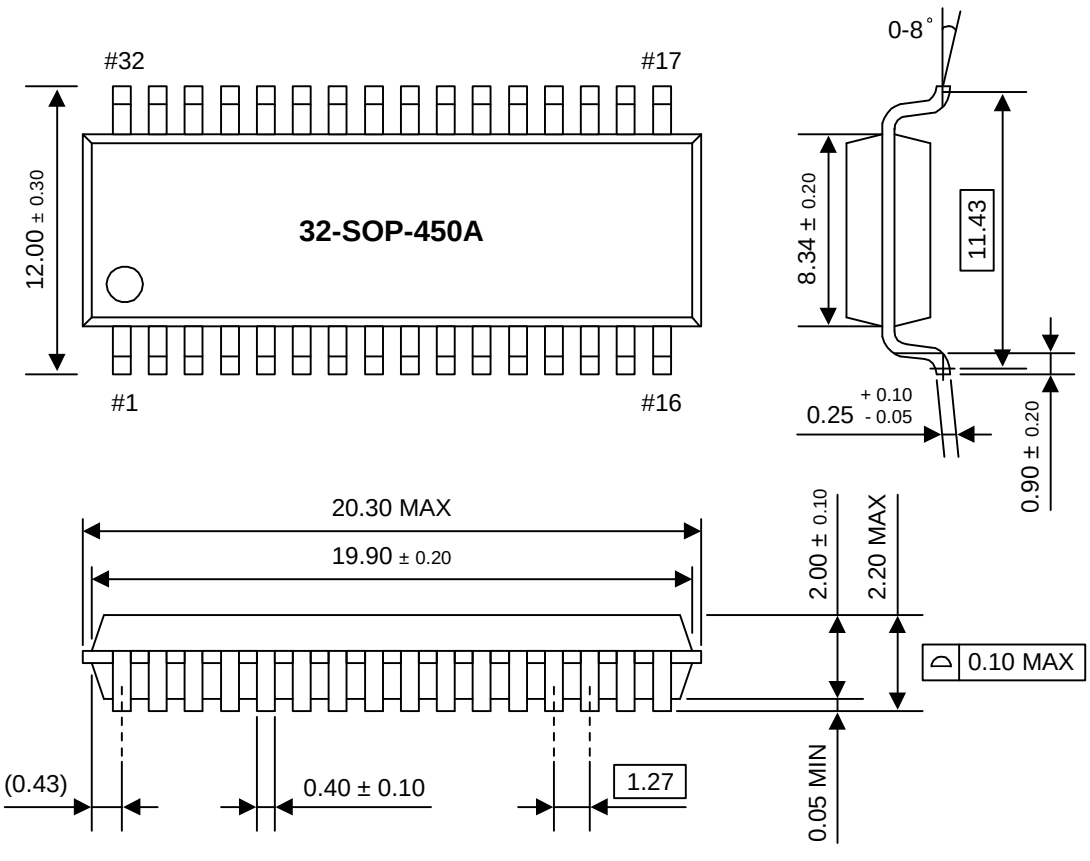
Instruction Clock = 1/6n x oscillator frequency (n = 1, 2, 8, or 16)
A: 1.7 V, 4 MHz

Figure 15-6. Operating Voltage Range of S3C80G9

16 MECHANICAL DATA

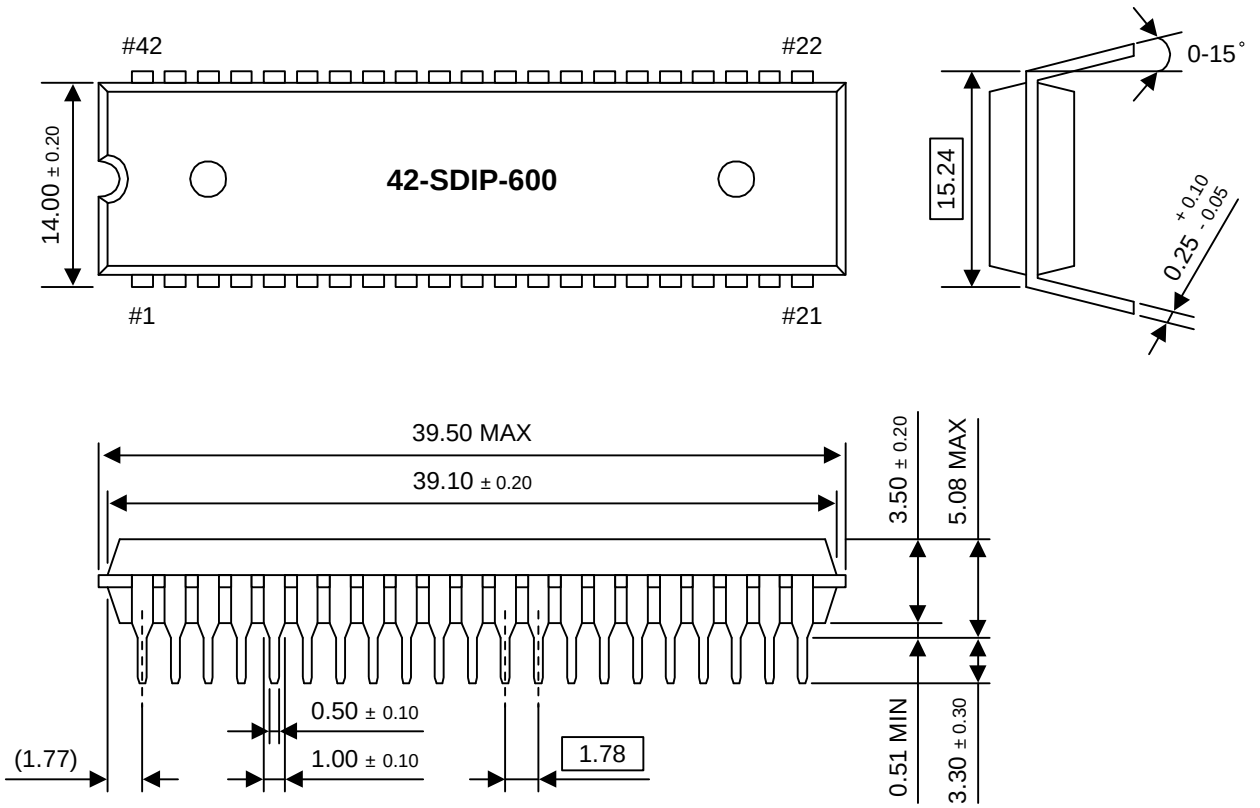
OVERVIEW

The S3C80F7/C80F9/C80G7/C80G9 microcontroller is currently available in a 32-pin SOP, 42-pin SDIP and 44-pin QFP package.



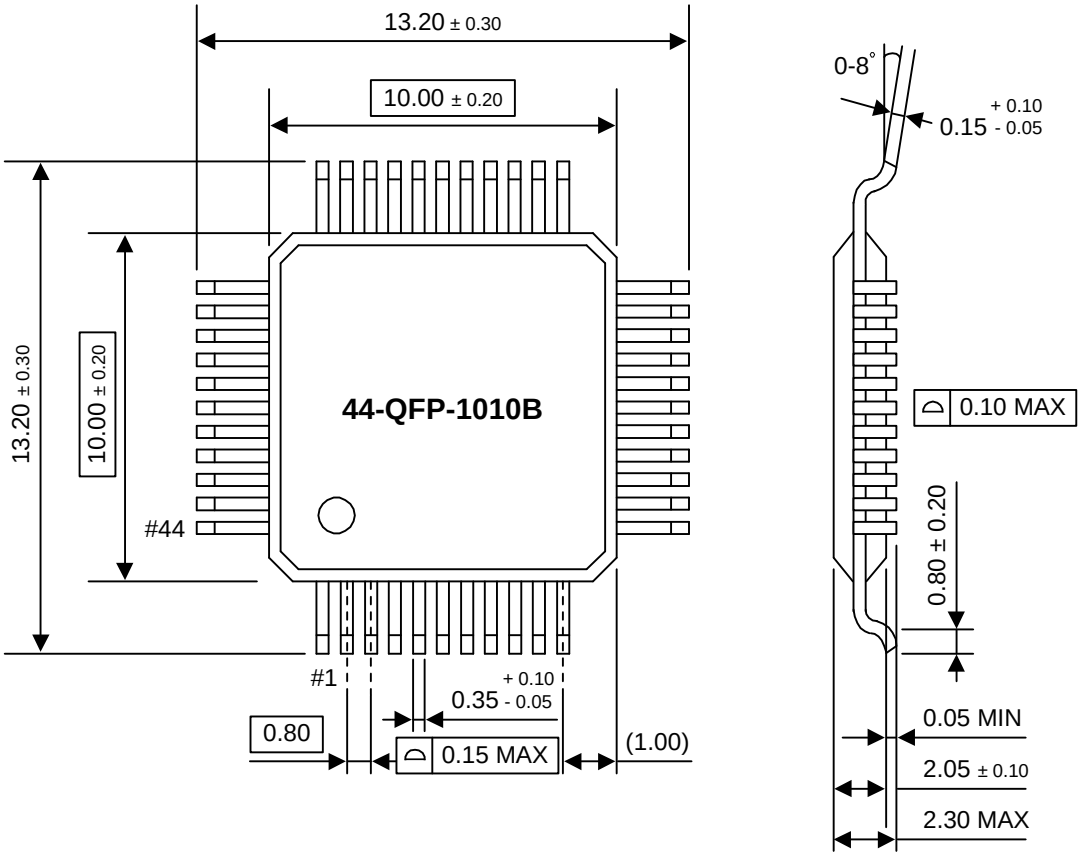
NOTE: Dimensions are in millimeters.

Figure 16-1. 32-Pin SOP Package Dimension



NOTE: Dimensions are in millimeters.

Figure 16-2. 42-Pin SDIP Package Dimension



NOTE: Dimensions are in millimeters.

Figure 16-3. 44-Pin SQFP Package Dimension