ATtiny25/ATtiny45/ATtiny85

Appendix B - Automotive Specification at 1.8V

DATASHEET

This document contains information specific to devices operating at voltage between 1.8V and 3.6V. Only deviations with standard operating characteristics are covered in this appendix, all other information can be found in the complete Automotive datasheet. The complete ATtiny25/ATtiny45/ATtiny85 automotive datasheet can be found on http://www.atmel.com

1. Electrical Characteristics

1.1 Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameters	Min.	Typ.	Max.	Unit
Operating temperature	–55		+150	°C
Storage temperature	–65		+175	°C
Voltage on any pin except $\overline{\text{RESET}}$ with respect to ground	–0.5		V_{CC} + 0.5	V
Voltage on $\overline{\text{RESET}}$ with respect to ground	–0.5		+13.0	V
Maximum operating voltage		6.0		V
DC current per I/O pin		30.0		mA
DC current V_{CC} and GND pins		200.0		mA

1.2 DC Characteristics

T_A = –40°C to +85°C, V_{CC} = 1.8V to 3.6V (unless otherwise noted)

Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
Input low voltage, except XTAL1 and $\overline{\text{RESET}}$ pin	V_{CC} = 1.8V - 3.6V	V_{IL}	–0.5		$0.2V_{CC}$[1]	V
Input high voltage, except XTAL1 and $\overline{\text{RESET}}$ pins	V_{CC} = 1.8V - 3.6V	V_{IH}	$0.7V_{CC}$[2]		V_{CC} + 0.5	V
Input low voltage, XTAL1 pin	V_{CC} = 1.8V - 3.6V	V_{IL1}	–0.5		$0.1V_{CC}$[1]	V
Input high voltage, XTAL1 pin	V_{CC} = 1.8V - 3.6V	V_{IH1}	$0.9V_{CC}$[2]		V_{CC} + 0.5	V
Input low voltage, $\overline{\text{RESET}}$ pin	V_{CC} = 1.8V - 3.6V	V_{IL2}	–0.5		$0.2V_{CC}$[1]	V
Input high voltage, $\overline{\text{RESET}}$ pin	V_{CC} = 1.8V - 3.6V	V_{IH2}	$0.9V_{CC}$[2]		V_{CC} + 0.5	V
Input low voltage, $\overline{\text{RESET}}$ pin as I/O	V_{CC} = 1.8V - 3.6V	V_{IL3}	–0.5		$0.3V_{CC}$[1]	V
Input high voltage, $\overline{\text{RESET}}$ pin as I/O	V_{CC} = 1.8V - 3.6V	V_{IH3}	$0.6V_{CC}$[2]		V_{CC} + 0.5	V
Output low voltage[3], I/O pin except RESET	I_{OL} = 0.5mA, V_{CC} = 1.8V	V_{OL}			0.4	V

Notes:
1. “Max” means the highest value where the pin is guaranteed to be read as low
2. “Min” means the lowest value where the pin is guaranteed to be read as high
3. Although each I/O port can sink more than the test conditions (0.5mA at V_{CC} = 1.8V) under steady state conditions (non-transient), the following must be observed:
   1] The sum of all IOL, for ports B0 - B5, should not exceed 50mA.
   If IOL exceeds the test condition, VOL may exceed the related specification. Pins are not guaranteed to sink current greater than the listed test condition.
4. Although each I/O port can source more than the test conditions (0.5mA at V_{CC} = 1.8V) under steady state conditions (non-transient), the following must be observed:
   1] The sum of all IOH, for ports B0 - B5 should not exceed 50mA.
   If IOH exceeds the test condition, VOH may exceed the related specification. Pins are not guaranteed to source current greater than the listed test condition.

1.2 DC Characteristics (Continued)

T_A = –40°C to +85°C, V_{CC} = 1.8V to 3.6V (unless otherwise noted)

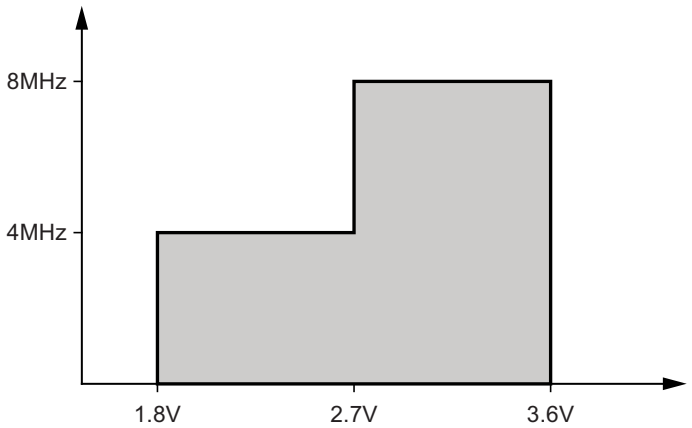
Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit
Output high voltage[4], I/O pin except RESET	I_{OH} = –0.5mA, V_{CC} = 1.8V	V_{OH}	1.2			V
Input leakage current I/O pin	V_{CC} = 3.6V, pin low (absolute value)	I_{IL}			1	µA
Input leakage current I/O pin	V_{CC} = 3.6V, pin high (absolute value)	I_{IH}			1	µA
Reset pull-up resistor		R_{RST}	30		60	kΩ
I/O pin pull-up resistor		R_{PU}	20		50	kΩ
Power supply current	Active 4MHz, V_{CC} = 1.8V	I_{CC}		0.8	1	mA
	Idle 4MHz, V_{CC} = 1.8V	I_{CC}		0.2	0.3	mA
Power-down mode	WDT disabled, V_{CC} = 1.8V WDT enabled, V_{CC} = 1.8V	I_{CC}		0.2 4	10 20	µA
Analog comparator Input offset voltage	V_{CC} = 2.7V V_{in} = V_{CC}/2	V_{ACIO}		< 10	40	mV
Analog comparator input leakage current	V_{CC} = 2.7V V_{in} = V_{CC}/2	I_{ACLK}	–50		50	nA
Analog comparator propagation delay	V_{CC} = 2.7V	t_{ACPD}		500		ns

Notes:
1. “Max” means the highest value where the pin is guaranteed to be read as low
2. “Min” means the lowest value where the pin is guaranteed to be read as high
3. Although each I/O port can sink more than the test conditions (0.5mA at V_{CC} = 1.8V) under steady state conditions (non-transient), the following must be observed:
   1] The sum of all IOL, for ports B0 - B5, should not exceed 50mA.
   If IOL exceeds the test condition, VOL may exceed the related specification. Pins are not guaranteed to sink current greater than the listed test condition.
4. Although each I/O port can source more than the test conditions (0.5mA at V_{CC} = 1.8V) under steady state conditions (non-transient), the following must be observed:
   1] The sum of all IOH, for ports B0 - B5 should not exceed 50mA.
   If IOH exceeds the test condition, VOH may exceed the related specification. Pins are not guaranteed to source current greater than the listed test condition.

1.3 Maximum Speed vs. V_{CC}

Maximum frequency is dependent on V_{CC}. As shown in Figure 1-1, the maximum frequency versus V_{CC} curve is linear between $1.8V < V_{CC} < 3.6V$.

Figure 1-1. Maximum Frequency versus V_{CC}



1.4 ADC Characteristics

T_A = –40°C to +85°C, V_{CC} = 1.8V to 3.6V (unless otherwise noted)

Parameter	Condition	Symbol	Min	Typ	Max	Unit
Resolution				8		Bits
Absolute accuracy (Including INL, DNL, quantization error, gain and offset error)	V_{REF} = 2.7V, V_{CC} = 2.7V, ADC clock = 200kHz			2	3.5	LSB
	V_{REF} = 2.7V, V_{CC} = 2.7V, ADC clock = 200kHz Noise reduction mode			2	3.5	LSB
Integral non-linearity (INL)	V_{REF} = 2.7V, V_{CC} = 2.7V, ADC clock = 200kHz			0.6	2.5	LSB
Differential non-linearity (DNL)	V_{REF} = 2.7V, V_{CC} = 2.7V, ADC clock = 200kHz			0.30	1.0	LSB
Gain error	V_{REF} = 2.7V, V_{CC} = 2.7V, ADC clock = 200kHz		–3.5	–1.3	+3.5	LSB
Offset error	V_{REF} = 2.7V, V_{CC} = 2.7V, ADC clock = 200kHz			1.8	3.5	LSB
Conversion time	Free running conversion		13 cycles			µs
Clock frequency			50		200	kHz
Analog supply voltage		AV_{CC}	V_{CC} – 0.3		V_{CC} + 0.3	V
Reference voltage		V_{REF}	1.0		AV_{CC}	V
Input voltage		V_{IN}	GND		V_{REF} – 50mV	V
Input bandwidth				38.5		kHz
Internal voltage reference		V_{INT}	1.0	1.1	1.2	V
Reference input resistance		R_{REF}	25.6	32	38.4	kΩ
Analog input resistance		R_{AIN}		100		MΩ

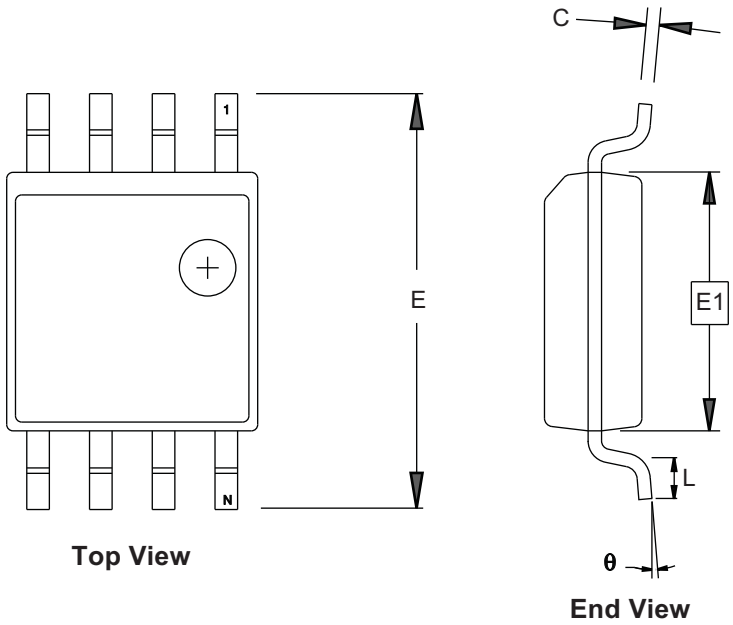
2. Ordering Information

Power Supply	Speed (MHz)	ISP Flash	Ordering Code	Package	Operation Range
1.8 - 3.6V	4-8	2KB	ATtiny25V-15ST	8S2	Automotive (–40°C to +85°C)
1.8 - 3.6V	4-8	4KB	ATtiny45V-15ST	8S2	Automotive (–40°C to +85°C)
1.8 - 3.6V	4-8	8KB	ATtiny85V-15ST	8S2	Automotive (–40°C to +85°C)

3. Package Information

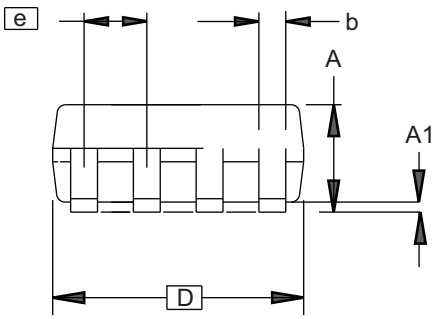
Package Type	Remarks
8S2	8-lead, 0.208" wide, plastic gull-wing small outline (EIAJ SOIC)

Figure 3-1. 8S2



Top View

End View



Side View

COMMON DIMENSIONS

(Unit of Measure = mm)

Symbol	MIN	NOM	MAX	NOTE
A	1.70		2.16	
A1	0.05		0.25	
b	0.35		0.48	4
C	0.15		0.35	4
D	5.13		5.35	
E1	5.18		5.40	2
E	7.70		8.26	
L	0.51		0.85	
θ	0°		8°	
e	1.27 BSC			3

Notes:
1. This drawing is for general information only; refer to EIAJ Drawing EDR-7320 for additional information.
2. Mismatch of the upper and lower dies and resin burrs aren't included.
3. Determines the true geometric position.
4. Values b,C apply to plated terminal. The standard thickness of the plating layer shall measure between 0.007 to .021 mm.

04/15/08

Atmel Package Drawing Contact: packagedrawings@atmel.com	TITLE	GPC	DRAWING NO.	REV.
	8S2, 8-lead, 0.208" Body, Plastic Small Outline Package (EIAJ)	STN	8S2	F

4. Revision History

Please note that the following page numbers referred to in this section refer to the specific revision mentioned, not to this document.

Revision No.	History
7669E-AVR-04/14	• Put datasheet in the latest template

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