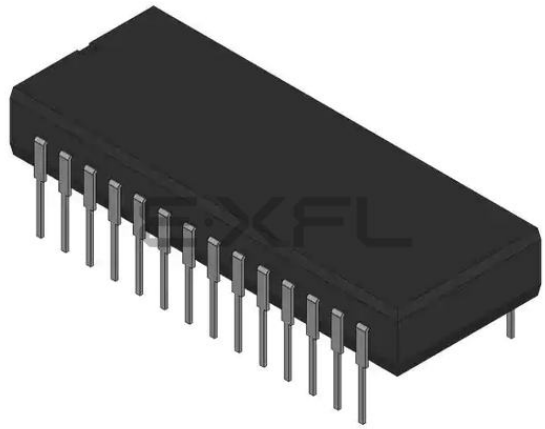


Welcome to E-XFL.COM

What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

Applications of "Embedded - Microcontrollers"

Details	
Product Status	Obsolete
Core Processor	S08
Core Size	8-Bit
Speed	20MHz
Connectivity	LINbus, SCI
Peripherals	LVD, POR, PWM
Number of I/O	24
Program Memory Size	4KB (4K x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	256 x 8
Voltage - Supply (Vcc/Vdd)	2.7V ~ 5.5V
Data Converters	A/D 8x10b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 85°C (TA)
Mounting Type	Through Hole
Package / Case	28-DIP (0.600", 15.24mm)
Supplier Device Package	28-PDIP
Purchase URL	https://www.e-xfl.com/pro/item?MUrl=&PartUrl=mc9s08se4crl

2 Pin Assignments

This chapter shows the pin assignments in the packages available for the MC9S08SE8 series.

Table 1. Pin Availability by Package Pin-Count

Pin Number (Package)		<-- Lowest **Priority** --> Highest			
28 (SOIC/PDIP)	**16 (TSSOP)**	**Port Pin**	**Alt 1**	**Alt 2**	**Alt 3**
1	—	PTC5			
2	—	PTC4			
3	1	PTA5	IRQ	TCLK	$\overline{\text{RESET}}$
4	2	PTA4		BKGD	MS
5	3				V_{DD}
6	—			V_{DDA}	V_{REFH}
7	—			V_{SSA}	V_{REFL}
8	4				V_{SS}
9	5	PTB7	EXTAL		
10	6	PTB6	XTAL		
11	7	PTB5			
12	8	PTB4		TPM2CH0	
13	—	PTC3			
14	—	PTC2			
15	—	PTC1			
16	—	PTC0			
17	9	PTB3	KBIP7		ADP9
18	10	PTB2	KBIP6		ADP8
19	11	PTB1	KBIP5	TxD	ADP7
20	12	PTB0	KBIP4	RxD	ADP6
21	—	PTA7		TPM1CH1[1]	ADP5
22	—	PTA6		TPM1CH0[1]	ADP4
23	13	PTA3	KBIP3		ADP3
24	14	PTA2	KBIP2		ADP2
25	15	PTA1	KBIP1	TPM1CH1[1]	ADP1
26	16	PTA0	KBIP0	TPM1CH0[1]	ADP0
27	—	PTC7			
28	—	PTC6			

[1] TPM1 pins can be remapped to PTA7, PTA6 and PTA1,PTA0

3 Electrical Characteristics

This chapter contains electrical and timing specifications.

3.1 Parameter Classification

The electrical parameters shown in this supplement are guaranteed by various methods. To give the customer a better understanding, the following classification is used and the parameters are tagged accordingly in the tables where appropriate:

Table 2. Parameter Classifications

P	Those parameters are guaranteed during production testing on each individual device.
C	Those parameters are achieved by the design characterization by measuring a statistically relevant sample size across process variations.
T	Those parameters are achieved by design characterization on a small sample size from typical devices under typical conditions unless otherwise noted. All values shown in the typical column are within this category.
D	Those parameters are derived mainly from simulations.

NOTE

The classification is shown in the column labeled “C” in the parameter tables where appropriate.

3.2 Absolute Maximum Ratings

Absolute maximum ratings are stress ratings only, and functional operation at the maxima is not guaranteed. Stress beyond the limits specified in Table 3 may affect device reliability or cause permanent damage to the device. For functional operating conditions, refer to the remaining tables in this section.

This device contains circuitry protecting against damage due to high static voltage or electrical fields; however, it is advised that normal precautions be taken to avoid application of any voltages higher than maximum-rated voltages to this high-impedance circuit. Reliability of operation is enhanced if unused inputs are tied to an appropriate logic voltage level (for instance, either V_{SS} or V_{DD}) or the programmable pull-up resistor associated with the pin is enabled.

Table 3. Absolute Maximum Ratings

Rating	Symbol	Value	Unit
Supply voltage	V_{DD}	–0.3 to 5.8	V
Maximum current into V_{DD}	I_{DD}	120	mA
Digital input voltage	V_{In}	–0.3 to V_{DD} + 0.3	V
Instantaneous maximum current Single pin limit (applies to all port pins)[1, 2, 3]	I_D	±25	mA
Storage temperature range	T_{stg}	–55 to 150	°C

1 Input must be current limited to the value specified. To determine the value of the required current-limiting resistor, calculate resistance values for positive (V_{DD}) and negative (V_{SS}) clamp voltages, then use the larger of the two resistance values.

2 All functional non-supply pins are internally clamped to V_{SS} and V_{DD}.

3 Power supply must maintain regulation within operating V_{DD} range during instantaneous and operating maximum current conditions. If positive injection current ($V_{In} > V_{DD}$) is greater than I_{DD}, the injection current may flow out of V_{DD} and could result in external power supply going out of regulation. Ensure external V_{DD} load will shunt current greater than maximum injection current. This will be the greatest risk when the MCU is not consuming power. Examples are: if no system clock is present, or if the clock rate is very low (which would reduce overall power consumption).

3.3 Thermal Characteristics

This section provides information about operating temperature range, power dissipation, and package thermal resistance. Power dissipation on I/O pins is usually small compared to the power dissipation in on-chip logic and voltage regulator circuits, and it is user-determined rather than being controlled by the MCU design. To take $P_{I/O}$ into account in power calculations, determine the difference between actual pin voltage and V_{SS} or V_{DD} and multiply by the pin current for each I/O pin. Except in cases of unusually high pin current (heavy loads), the difference between pin voltage and V_{SS} or V_{DD} will be very small.

Table 4. Thermal Characteristics

Rating		Symbol	Value	Unit
Operating temperature range (packaged) C V M		T_A	T_L to T_H –40 to 85 –40 to 105 –40 to 125	°C
Maximum junction temperature		T_{JM}	135	°C
Thermal resistance single-layer board	28-pin SOIC	θ_{JA}	70	°C/W
	28-pin PDIP		68	
	16-pin TSSOP		129	
Thermal resistance four-layer board	28-pin SOIC		48	°C/W
	28-pin PDIP		49	
	16-pin TSSOP		85	

The average chip-junction temperature (T_J) in °C can be obtained from:

$$T_J = T_A + (P_D \times \theta_{JA}) \quad \textit{Eqn. 1}$$

Where:

T_A = Ambient temperature, °C
θ_{JA} = Package thermal resistance, junction-to-ambient, °C/W
$P_D = P_{int} + P_{I/O}$
$P_{int} = I_{DD} \times V_{DD}$, Watts — chip internal power
$P_{I/O}$ = Power dissipation on input and output pins — user-determined

For most applications, $P_{I/O} << P_{int}$ and can be neglected. An approximate relationship between P_D and T_J (if $P_{I/O}$ is neglected) is:

$$P_D = K \div (T_J + 273°C) \quad \textit{Eqn. 2}$$

Solving Equation 1 and Equation 2 for K gives:

$$K = P_D \times (T_A + 273°C) + \theta_{JA} \times (P_D)^2 \quad \textit{Eqn. 3}$$

Where K is a constant pertaining to the particular part. K can be determined from Equation 3 by measuring P_D (at equilibrium) for a known T_A. Using this value of K, the values of P_D and T_J can be obtained by solving Equation 1 and Equation 2 iteratively for any value of T_A.

3.4 ESD Protection and Latch-Up Immunity

Although damage from electrostatic discharge (ESD) is much less common on these devices than on early CMOS circuits, normal handling precautions should be used to avoid exposure to static discharge. Qualification tests are performed to ensure that these devices can withstand exposure to reasonable levels of static without suffering any permanent damage.

During the device qualification ESD stresses were performed for the human body model (HBM), the machine model (MM) and the charge device model (CDM).

A device is defined as a failure if after exposure to ESD pulses the device no longer meets the device specification. Complete DC parametric and functional testing is performed per the applicable device specification at room temperature followed by hot temperature, unless specified otherwise in the device specification.

Table 5. ESD and Latch-up Test Conditions

Model	Description	Symbol	Value	Unit
Human body	Series resistance	R1	1500	Ω
	Storage capacitance	C	100	pF
	Number of pulses per pin	—	3	—
Machine	Series resistance	R1	0	Ω
	Storage capacitance	C	200	pF
	Number of pulses per pin	—	3	—

Table 7. DC Characteristics (continued)

Num	C	Parameter	Symbol	Min	Typical[1]	Max	Unit
25	T	Low-voltage inhibit reset/recover hysteresis 5 V 3 V	V_{hys}	 — —	 100 60	 — —	mV
26	P	Bandgap voltage reference[9]	V_{BG}	1.18	1.20	1.21	V

1 Typical values are measured at 25 °C. Characterized, not tested.

2 Measured with $V_{In} = V_{DD}$ or V_{SS}.

3 Measured with $V_{In} = V_{SS}$.

4 Measured with $V_{In} = V_{DD}$.

5 All functional non-supply pins are internally clamped to V_{SS} and V_{DD}.

6 Input must be current-limited to the value specified. To determine the value of the required current-limiting resistor, calculate resistance values for positive and negative clamp voltages, then use the larger of the two values.

7 Power supply must maintain regulation within operating V_{DD} range during instantaneous and operating maximum current conditions. If positive injection current ($V_{In} > V_{DD}$) is greater than I_{DD}, the injection current may flow out of V_{DD} and could result in external power supply going out of regulation. Ensure external V_{DD} load will shunt current greater than maximum injection current. This will be the greatest risk when the MCU is not consuming power. Examples are: if no system clock is present, or if clock rate is very low (which would reduce overall power consumption).

8 Maximum is highest voltage that POR is guaranteed.

9 Factory trimmed at V_{DD} = 5.0 V, Temp = 25 °C.

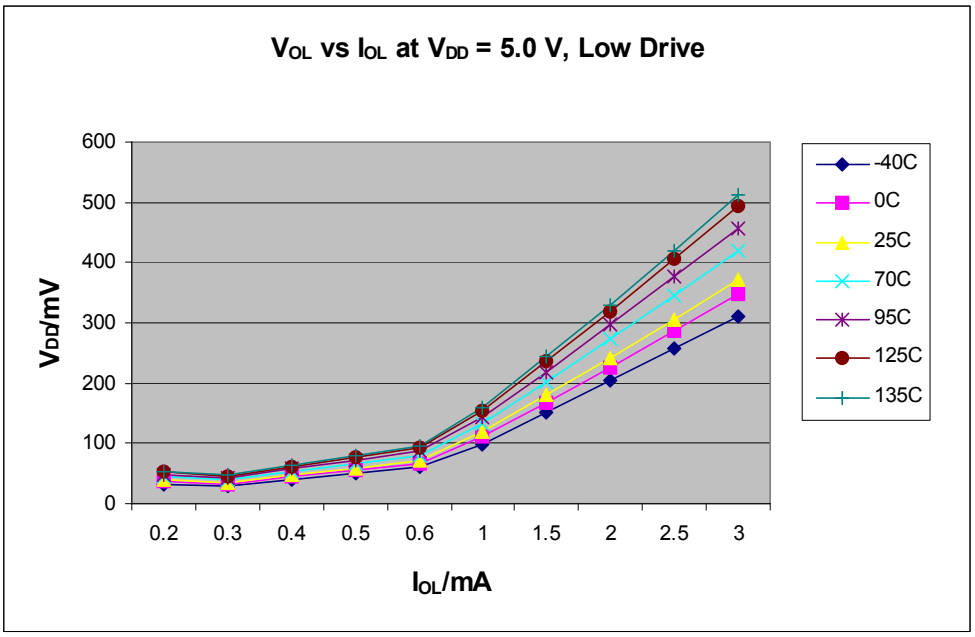


Figure 6. Typical V_{OL} vs. I_{OL} for Low Drive Enabled Pad (V_{DD} = 5 V)

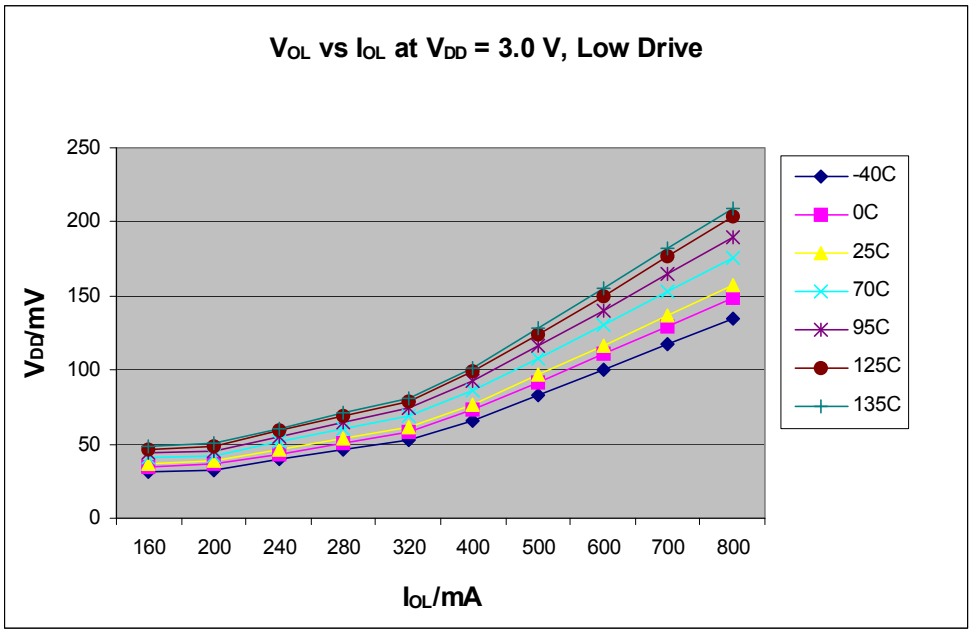


Figure 7. Typical V_{OL} vs. I_{OL} for Low Drive Enabled Pad (V_{DD} = 3 V)

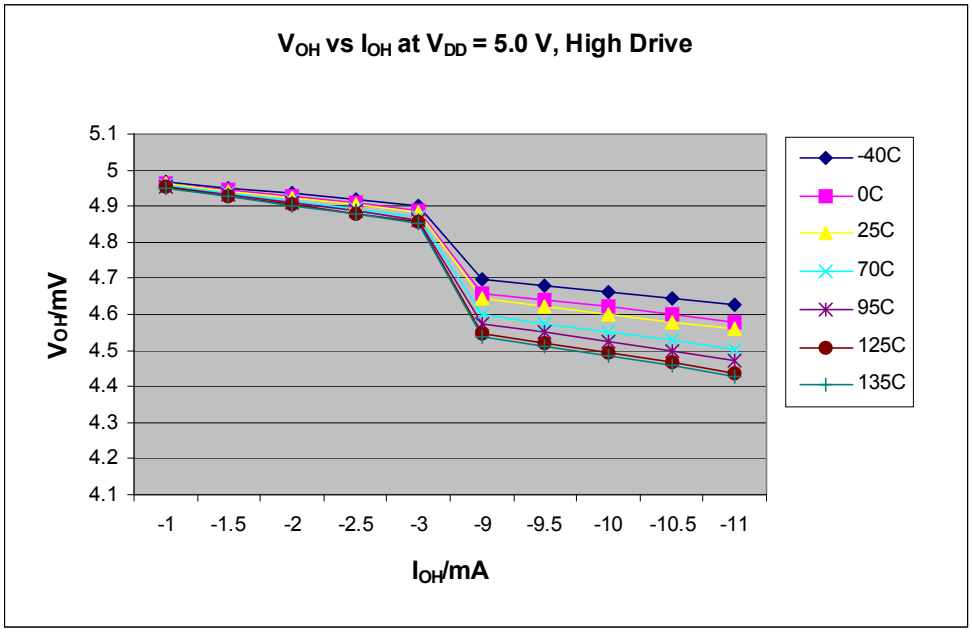


Figure 8. Typical V_{OH} vs. I_{OH} for High Drive Enabled Pad (V_{DD} = 5 V)

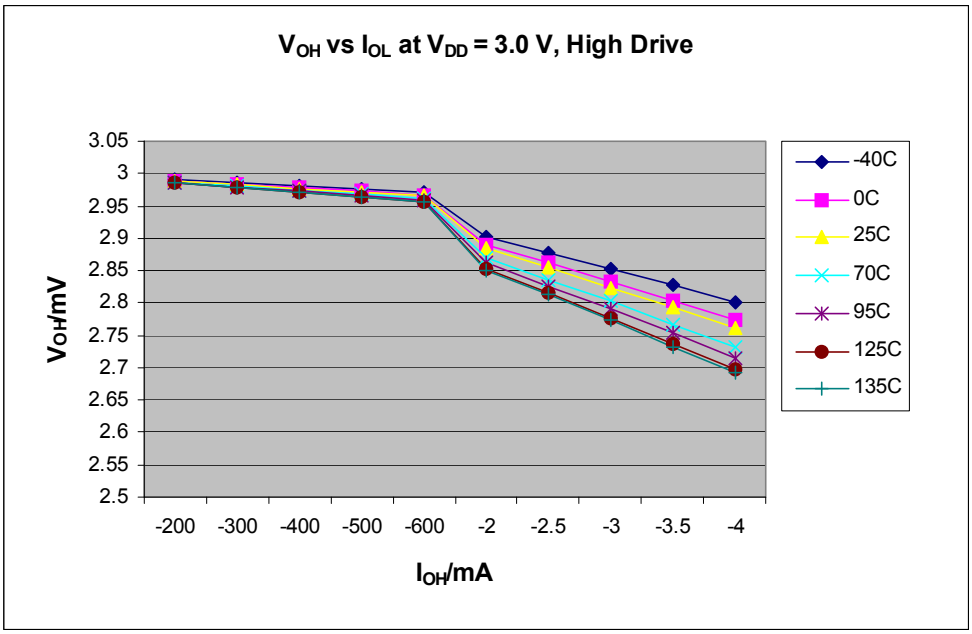


Figure 9. Typical V_{OH} vs. I_{OH} for High Drive Enabled Pad (V_{DD} = 3 V)

Table 8. Supply Current Characteristics

Num	C	Parameter	Symbol	V_{DD} (V)	Typical[1]	Max	Unit	Temp (°C)
1	C	Run supply current[2] measured at (CPU clock = 4 MHz, f_{Bus} = 2 MHz)	RI_{DD}	5	2.4	2.72	mA	–40 to 125
				3	2.18	2.26		
2	P	Run supply current[2] measured at (CPU clock = 20 MHz, f_{Bus} = 10 MHz)	RI_{DD}	5	6.35	7.29	mA	–40 to 125
				3	5.79	6.42		
3	P	Wait supply current[2] measured at f_{Bus} = 2 MHz	WI_{DD}	5	1.4	1.56	mA	–40 to 125
				3	1.36	1.53		
4	P	Stop2 mode supply current	$S2I_{DD}$	5	1.4	19 28 45.8	µA	–40 to 85 –40 to 105 –40 to 125
				3	1.3	15 22 37.2	µA	–40 to 85 –40 to 105 –40 to 125
5	P	Stop3 mode supply current	$S3I_{DD}$	5	1.61	23 43 76.1	µA	–40 to 85 –40 to 105 –40 to 125
				3	1.44	19 38 66.4	µA	–40 to 85 –40 to 105 –40 to 125
6	P	RTC adder to stop2 or stop3[3]	$S23I_{DDRTI}$	5	300	500 500	nA	–40 to 85 –40 to 125
				3	300	500 500	nA	–40 to 85 –40 to 125
7	C	LVD adder to stop3 (LVDE = LVDSE = 1)	$S3I_{DDLVD}$	5	122	180	µA	–40 to 125
				3	110	160	µA	–40 to 125
8	C	Adder to stop3 for oscillator enabled[4] (OSCSTEN =1)	$S3I_{DDOSC}$	5,3	5	8	µA	–40 to 125

1 Typical values are based on characterization data at 25 °C unless otherwise stated. See Figure 12 through Figure 13 for typical curves across voltage/temperature.

2 All modules except ADC active, ICS configured for FBE, and does not include any dc loads on port pins.

3 Most customers are expected to find that auto-wakeup from stop2 or stop3 can be used instead of the higher current wait mode. Wait mode typical is 220 µA at 5 V with f_{Bus} = 1 MHz.

4 Values given under the following conditions: low range operation (RANGE = 0) with a 32.768 kHz crystal and low power mode (HGO = 0).

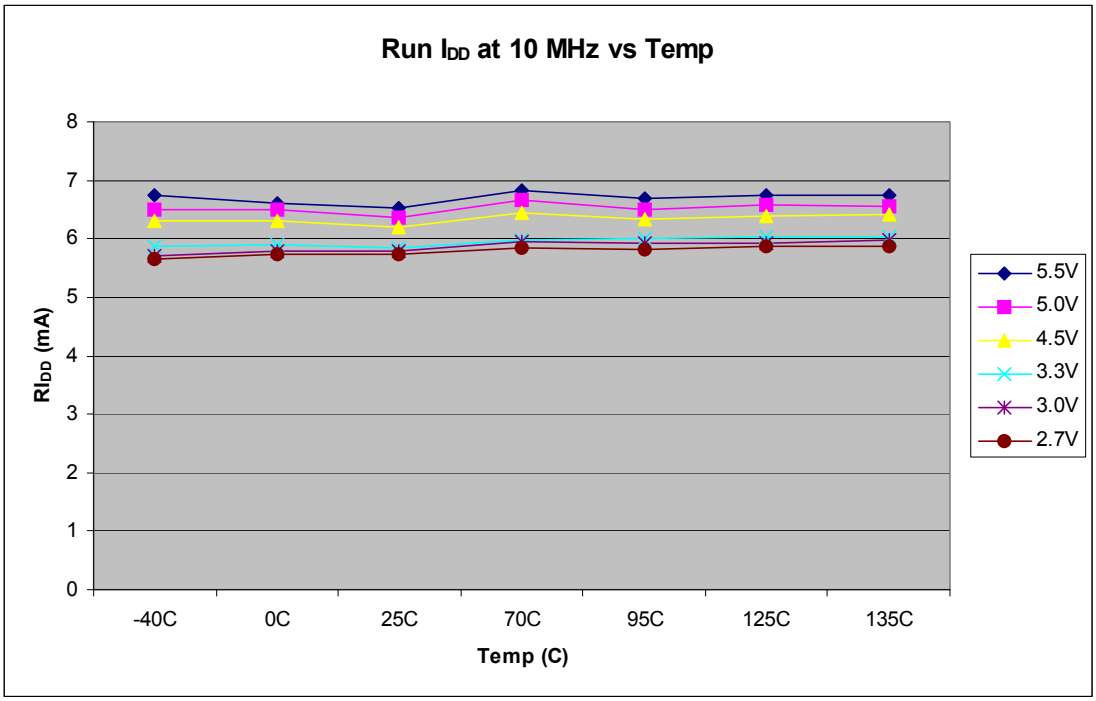


Figure 12. Typical Run I_{DD} Curves

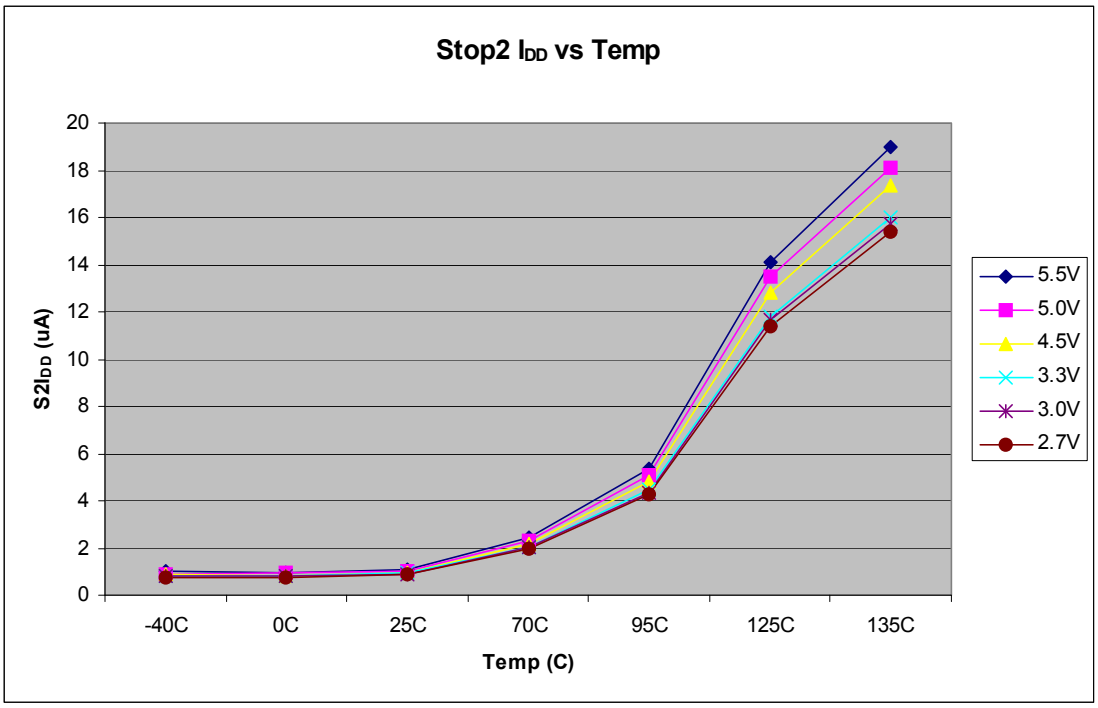


Figure 13. Typical Stop2 I_{DD} Curves

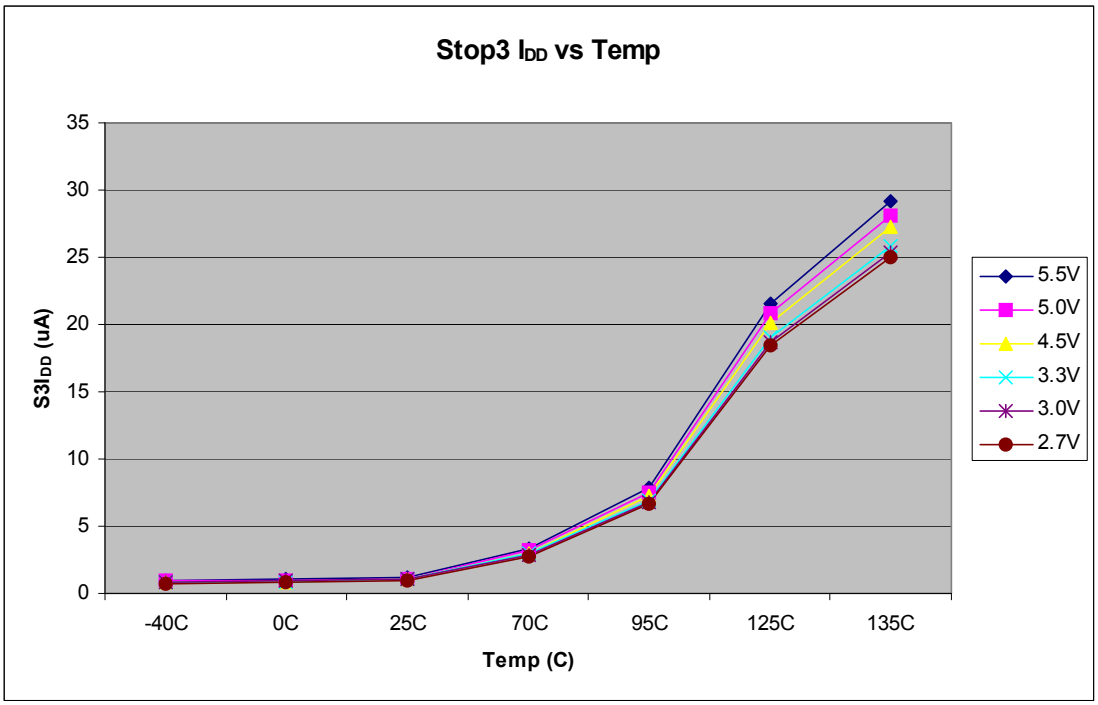


Figure 14. Typical Stop3 I_{DD} Curves

3.7 External Oscillator (XOSC) Characteristics

Table 9. Oscillator electrical specifications (Temperature Range = –40 to 125°C Ambient)

Num	C	Characteristic	Symbol	Min.	Typical[1]	Max.	Unit
1	C	Oscillator crystal or resonator (EREFS = 1, ERCLKEN = 1) Low range (RANGE = 0) High range (RANGE = 1), high gain (HGO = 1)[2] High range (RANGE = 1), low power (HGO = 0)[2]	 f_{lo} f_{hi-hgo} f_{hi-lp}	 32 1 1	 — — —	 38.4 16 8	 kHz MHz MHz
2	—	Load capacitors	C_1,C_2	See crystal or resonator manufacturer's recommendation			
3	—	Feedback resistor Low range (32 kHz to 100 kHz) High range (1 MHz to 16 MHz)	R_F	 — —	 10 1	 — —	MΩ
4	—	Series resistor Low range, low gain (RANGE = 0, HGO = 0) Low range, high gain (RANGE = 0, HGO = 1) High range, low gain (RANGE = 1, HGO = 0)	R_S	 — — —	 0 100 0	 — — —	kΩ
		High range, high gain (RANGE = 1, HGO = 1) ≥ 8 MHz 4 MHz 1 MHz		 — — —	 0 0 0	 0 10 20	

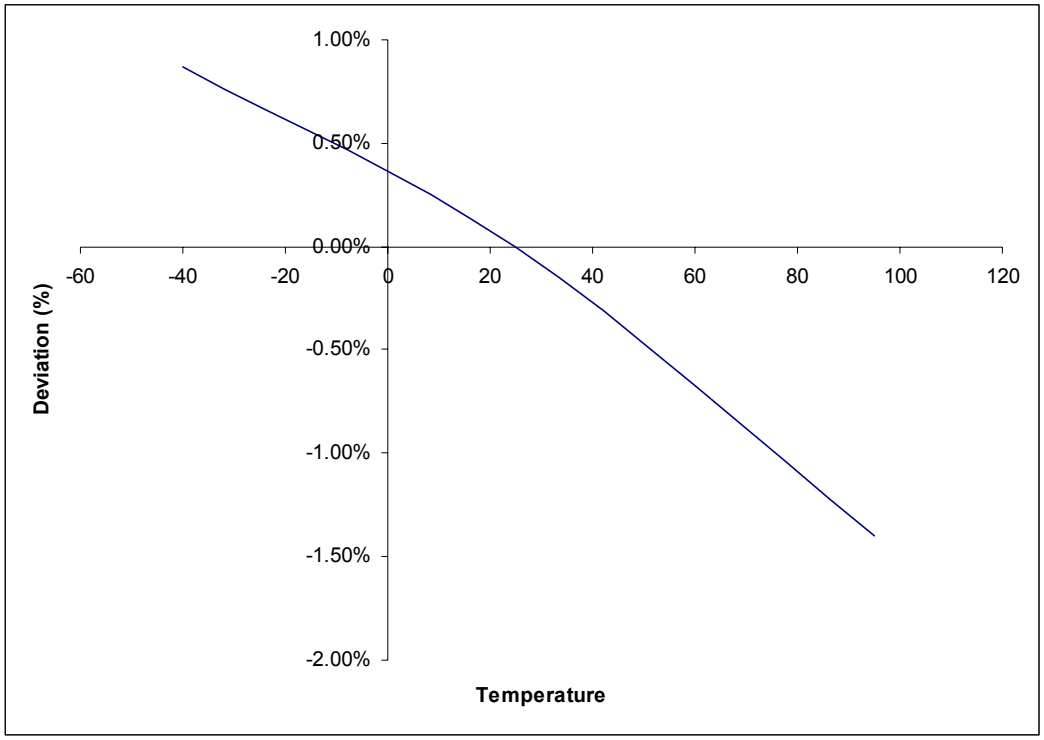


Figure 17. Deviation of DCO Output from Trimmed Frequency (20 MHz, 3.0 V)

3.9 ADC Characteristics

Table 11. 10-Bit ADC Operating Conditions

Characteristic	Conditions	Symb	Min	Typ[1]	Max	Unit	Comment
Supply voltage	Absolute	V_{DDA}	2.7	—	5.5	V	
	Delta to V_{DD} ($V_{DD} - V_{DDA}$)[2]	ΔV_{DDA}	–100	0	100	mV	
Ground voltage	Delta to V_{SS} ($V_{SS} - V_{SSA}$)[2]	ΔV_{SSA}	–100	0	100	mV	
Input voltage		V_{ADIN}	V_{REFL}	—	V_{REFH}	V	
Input capacitance		C_{ADIN}	—	4.5	5.5	pF	
Input resistance		R_{ADIN}	—	3	5	kΩ	
Analog source resistance	10-bit mode f_{ADCK} > 4MHz f_{ADCK} < 4MHz	R_{AS}	 — —	 — —	 5 10	kΩ	External to MCU
	8-bit mode (all valid f_{ADCK})		—	—	10		
ADC conversion clock frequency	High speed (ADLPC = 0)	f_{ADCK}	0.4	—	8.0	MHz	
	Low power (ADLPC = 1)		0.4	—	4.0		

1 Typical values assume V_{DDA} = 5.0 V, Temp = 25 °C, f_{ADCK} = 1.0 MHz unless otherwise stated. Typical values are for reference only and are not tested in production.

2 DC potential difference.

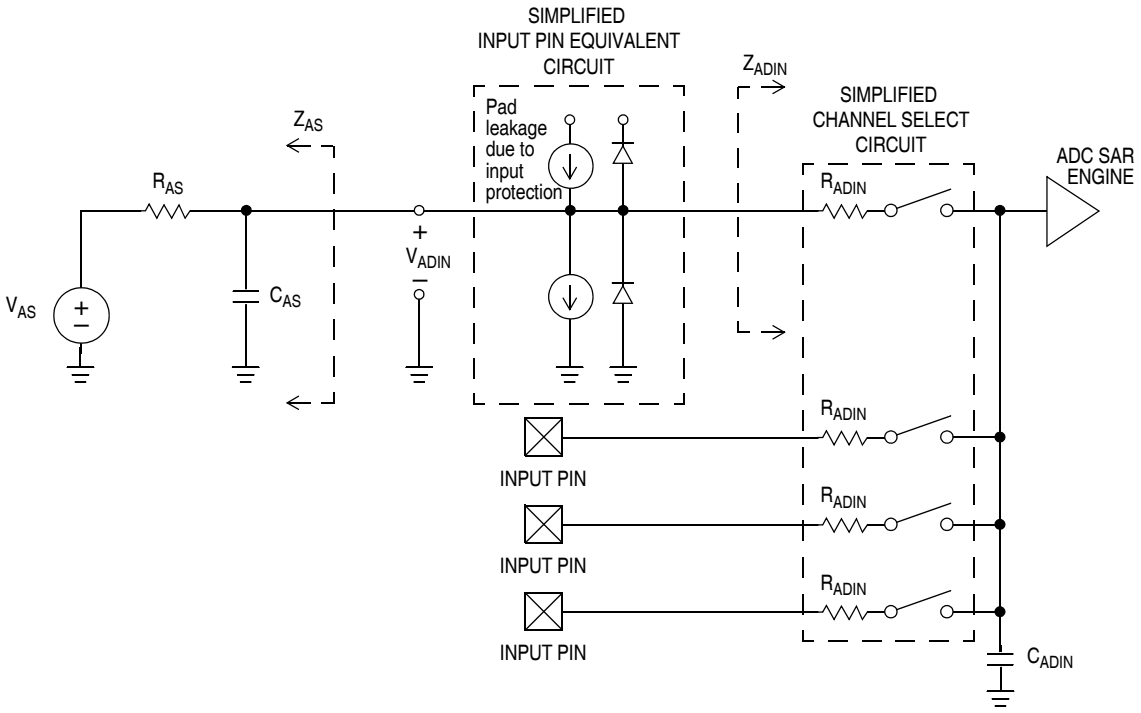


Figure 18. ADC Input Impedance Equivalency Diagram

Table 12. 10-Bit ADC Characteristics (V_{REFH} = V_{DDA}, V_{REFL} = V_{SSA})

Characteristic	Conditions	C	Symb	Min	Typ[1]	Max	Unit	Comment
Supply Current ADLPC = 1 ADLSMP = 1 ADCO = 1		T	I_{DDA}	—	133	—	µA	
Supply Current ADLPC = 1 ADLSMP = 0 ADCO = 1		T	I_{DDA}	—	218	—	µA	
Supply Current ADLPC = 0 ADLSMP = 1 ADCO = 1		T	I_{DDA}	—	327	—	µA	
Supply Current ADLPC = 0 ADLSMP = 0 ADCO = 1		D	I_{DDA}	—	0.582	1	mA	
Supply Current	Stop, Reset, Module Off	D	I_{DDA}	—	0.011	1	µA	

Table 12. 10-Bit ADC Characteristics (V_{REFH} = V_{DDA}, V_{REFL} = V_{SSA}) (continued)

Characteristic	Conditions	C	Symb	Min	Typ[1]	Max	Unit	Comment
Differential Non-Linearity	10-bit mode[3]	P	DNL	—	±0.5	±1.0	LSB[3]	
	8-bit mode[3]	P		—	±0.3	±0.5		
Integral Non-Linearity	10-bit mode	T	INL	—	±0.5	±1.0	LSB[3]	
	8-bit mode	T		—	±0.3	±0.5		
Zero-Scale Error	10-bit mode	P	E_{ZS}	—	±1.5	±2.1	LSB[3]	V_{ADIN} = V_{SSA}
	8-bit mode	P		—	±0.5	±0.7		
Full-Scale Error	10-bit mode	T	E_{FS}	—	±1	±1.5	LSB[3]	V_{ADIN} = V_{DDA}
	8-bit mode	T		—	±0.5	±0.5		
Quantization Error	10-bit mode	D	E_Q	—	—	±0.5	LSB[3]	
	8-bit mode			—	—	±0.5		
Input Leakage Error	10-bit mode	D	E_{IL}	—	±0.2	±2.5	LSB[3]	Pad leakage[4] * R_{AS}
	8-bit mode			—	±0.1	±1		

1 Typical values assume V_{DDA} = 5.0 V, Temp = 25 °C, f_{ADCK} = 1.0 MHz unless otherwise stated. Typical values are for reference only and are not tested in production.

2 Monotonicity and No-Missing-Codes guaranteed in 10-bit and 8-bit modes

3 1 LSB =(V_{REFH} – V_{REFL})/2^N

4 Based on input pad leakage current. Refer to pad electricals.

3.11 Flash Specifications

This section provides details about program/erase times and program-erase endurance for the flash memory.

Program and erase operations do not require any special power sources other than the normal V_{DD} supply. For more detailed information about program/erase operations, see the Memory section in the reference manual.

Table 15. Flash Characteristics

Num	C	Characteristic	Symbol	Min	Typical	Max	Unit
1	D	Supply voltage for program/erase	$V_{prog/erase}$	2.7	—	5.5	V
2	D	Supply voltage for read operation	V_{Read}	2.7	—	5.5	V
3	D	Internal FCLK frequency[1]	f_{FCLK}	150	—	200	kHz
4	D	Internal FCLK period (1/FCLK)	t_{Fcyc}	5	—	6.67	µs
5	P	Byte program time (random location)[2]	t_{prog}	9			t_{Fcyc}
6	P	Byte program time (burst mode)[2]	t_{Burst}	4			t_{Fcyc}
7	P	Page erase time[2]	t_{Page}	4000			t_{Fcyc}
8	P	Mass erase time[2]	t_{Mass}	20,000			t_{Fcyc}
9	C	Program/erase endurance[3] T_L to T_H = –40 °C to 125 °C T = 25 °C	n_{FLPE}	10,000	— 100,000	—	cycles
10	C	Data retention[4]	t_{D_ret}	15	100	—	years

1 The frequency of this clock is controlled by a software setting.

2 These values are hardware state machine controlled. User code does not need to count cycles. This information supplied for calculating approximate time to program and erase.

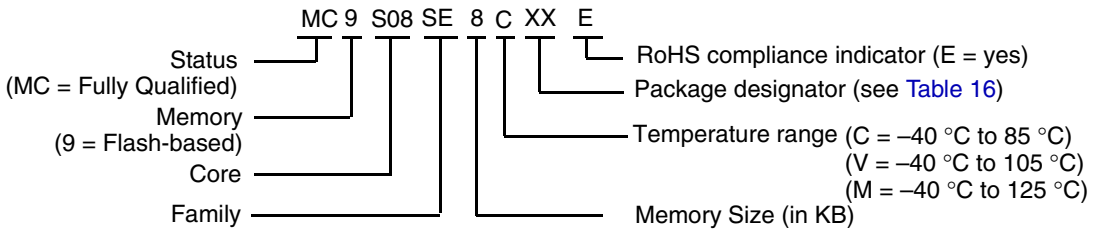
3 **Typical endurance for flash** was evaluated for this product family on the 9S12Dx64. For additional information on how Freescale defines typical endurance, please refer to Engineering Bulletin EB619/D, *Typical Endurance for Nonvolatile Memory*.

4 **Typical data retention** values are based on intrinsic capability of the technology measured at high temperature and de-rated to 25 °C using the Arrhenius equation. For additional information on how Freescale defines typical data retention, please refer to Engineering Bulletin EB618/D, *Typical Data Retention for Nonvolatile Memory*.

4 Ordering Information

This chapter contains ordering information for the device numbering system.

Example of the device numbering system:



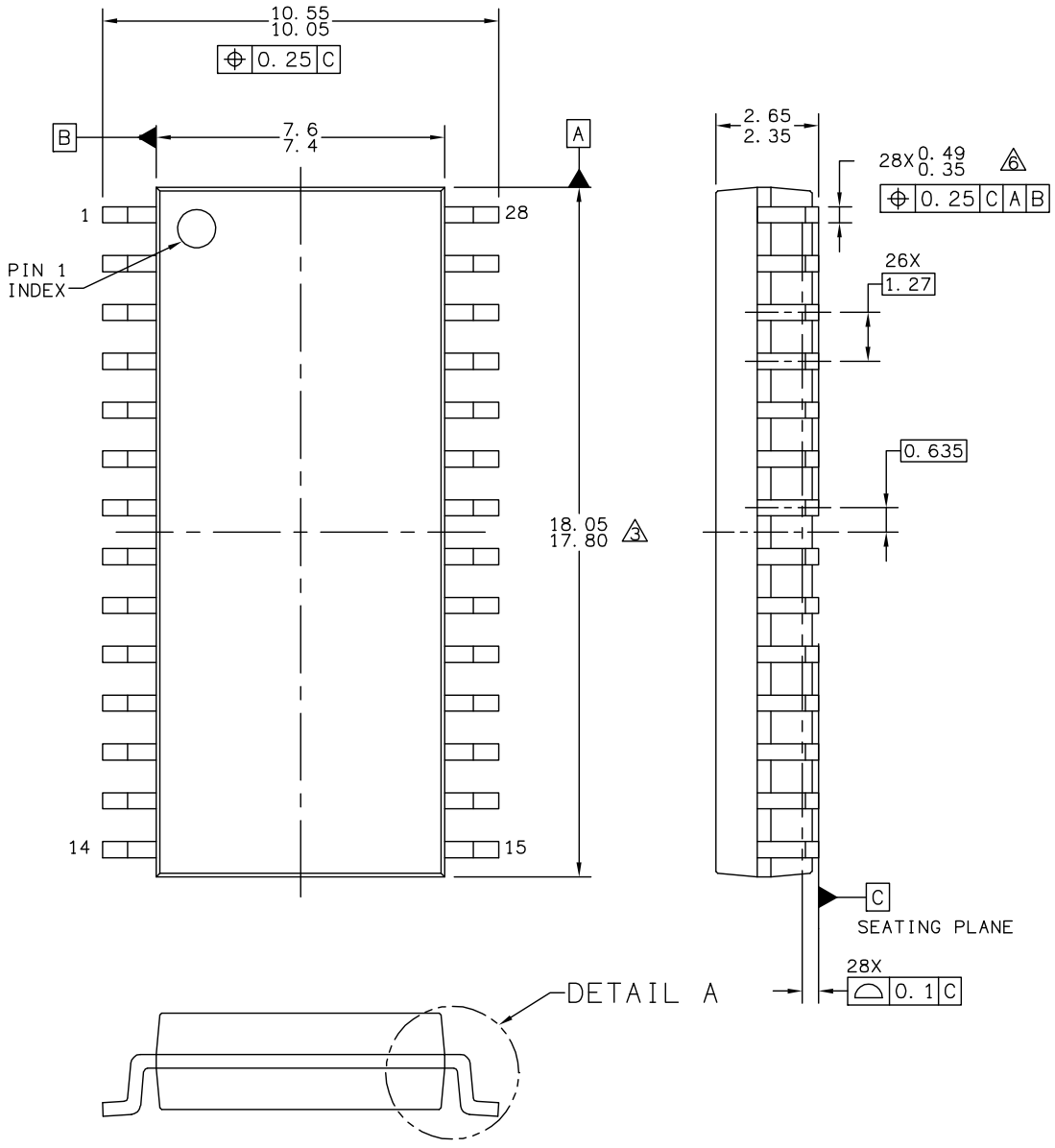
4.1 Package Information

Table 16. Package Descriptions

Pin Count	Package Type	Abbreviation	Designator	Case No.	Document No.
28	Plastic Dual In-line Pin	PDIP	RL	710	98ASB42390B
28	Small Outline Integrated Circuit	SOIC	WL	751F	98ASB42345B
16	Thin Shrink Small Outline Package	TSSOP	TG	948F	98ASH70247A

4.2 Mechanical Drawings

The following pages are mechanical drawings for the packages described in Table 16.



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
TITLE: SOIC, WIDE BODY, 28 LEAD CASEOUTLINE	DOCUMENT NO: 98ASB42345B	REV: G
	CASE NUMBER: 751F-05	10 MAR 2005
	STANDARD: MS-013AE	

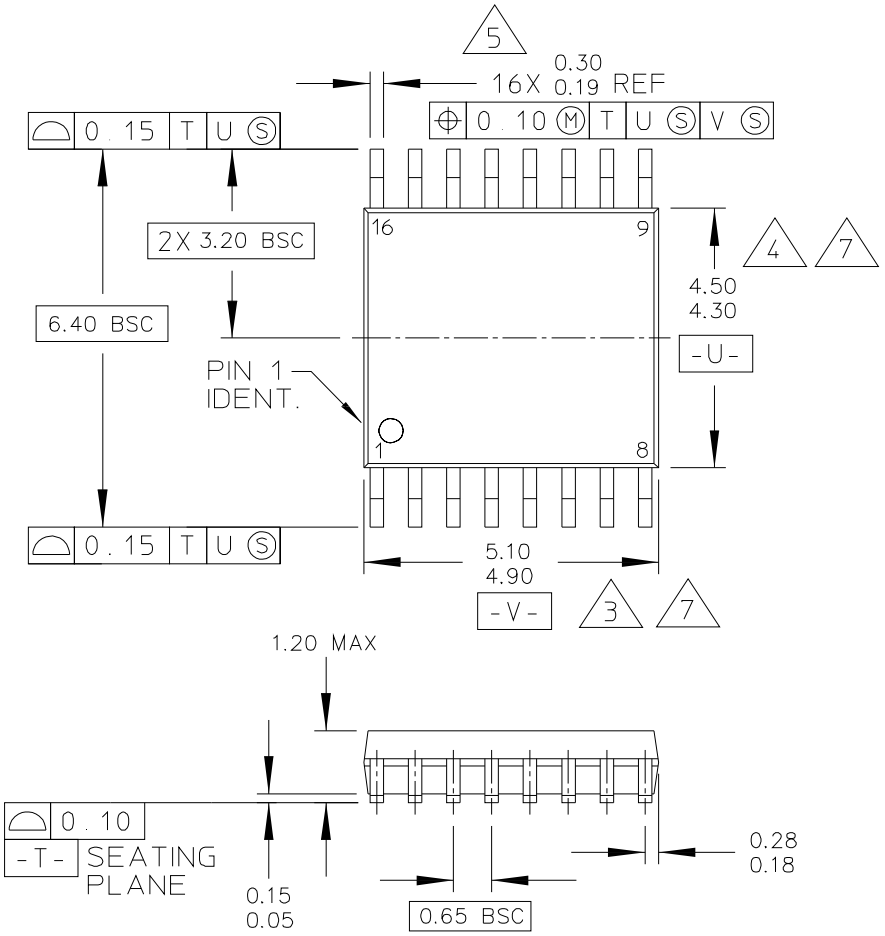
NOTES:

1. POSITIONAL TOLERANCE OF LEADS, SHALL BE WITHIN 0.25 MM (0.010) AT MAXIMUM MATERIAL CONDITION, IN RELATION TO SEATING PLANE AND EACH OTHER.
2. DIMENSION TO CENTER OF LEADS WHEN FORMED PARALLEL.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH.
4. 710-01 OBSOLETE, NEW STD 710-02.
5. CONTROLLING DIMENSION: INCH

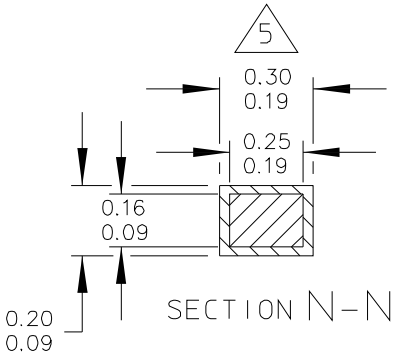
	INCH		MILLIMETER			INCH		MILLIMETER	
DIM	MIN	MAX	MIN	MAX	DIM	MIN	MAX	MIN	MAX
A	1.435	1.465	36.45	37.21					
B	0.540	0.560	13.72	14.22					
C	0.155	0.200	3.94	5.08					
D	0.014	0.022	0.36	0.56					
F	0.040	0.060	1.02	1.52					
G	0.100 BSC		2.54 BSC						
H	0.065	0.085	1.65	2.16					
J	0.008	0.015	0.20	0.38					
K	0.115	0.135	2.92	3.43					
L	0.600 BSC		15.24 BSC						
M	0°	15°	0°	15°					
N	0.020	0.040	0.51	1.02					

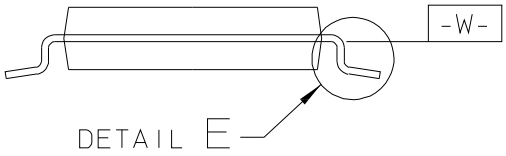
MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE

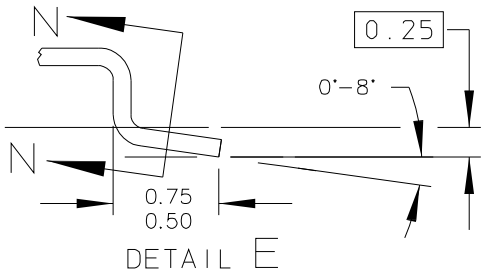
TITLE:	DOCUMENT NO: 98ASB42390B	REV: D
28 LD PDIP	CASE NUMBER: 710-02	24 MAY 2005
	STANDARD: NON-JEDEC	



© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
TITLE: 16 LD TSSOP, PITCH 0.65MM	DOCUMENT NO: 98ASH70247A	REV: B
	CASE NUMBER: 948F-01	19 MAY 2005
	STANDARD: JEDEC	







© FREESCALE SEMICONDUCTOR, INC. ALL RIGHTS RESERVED.	MECHANICAL OUTLINE	PRINT VERSION NOT TO SCALE
TITLE: 16 LD TSSOP, PITCH 0.65MM	DOCUMENT NO: 98ASH70247A	REV: B
	CASE NUMBER: 948F-01	19 MAY 2005
	STANDARD: JEDEC	

How to Reach Us:

Home Page:
www.freescale.com

Web Support:
http://www.freescale.com/support

USA/Europe or Locations Not Listed:
Freescale Semiconductor, Inc.
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
Beijing 100022
China
+86 10 5879 8000
support.asia@freescale.com

Document Number: MC9S08SE8
Rev. 4
4/2015

freescale™
semiconductor