CORERIVER
Total Solution of MCU

MiDAS3.0 Family

8-Bit Turbo Microcontroller

(GC89L5xxA0)

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1 MiDAS3.0 Family Overview

1.1 General Description

MiDAS3.0 Family is a high-speed 80C52 compatible Microcontroller. It executes all of the conventional 80C52 instructions. The instruction execution of MiDAS3.0 is max. 3 times faster than of traditional 80C52.

MiDAS3.0 Family has three timer/counters, maximum 32 programmable I/O pins, 12-channel PWM outputs in two 6-module PCA, PLL, Watchdog timer, POR (Power-On Reset), two full-duplex UART, 32-channel 10-bit ADC and LVD (Low Voltage Detector) as peripherals. In addition, it contains an internal ring oscillator, which can generate the 12 MHz system clock signal instead of a crystal oscillator.

MiDAS3.0-Family operates over the extended -20℃ to +85℃ temperature range, and is available in the 44-pin MQFP, 32-pin QFN package.

1.2 Features

- CPU
  - 8-bit Turbo 80C52 Architecture
  - 4 Cycles / 1 Machine Cycle
  - Instruction Level Compatible with Intel 80C52
- Memory
  - 64KB Flash (Including 2KB User EEPROM)
  - 16KB Internal Aux. RAM
  - 256B Internal RAM
- Power Supply
  - Core : +1.62V to +1.98V(VDD pin),
  - IO : +3.0V to +3.6V(VDDIO pin)
- Operating Frequency: Max. 100MHz
- 32 Programmable I/O Pins
- Two Programmable Counter Arrays

- 8-bit/16-bit dynamic PWM
- 16-bit Compare/Capture counter
- High Speed Output

- Communication interfaces
  - 2-channel UART Communication
- 32-channel 10-bit ADC
- Supporting ISP/IAP/MDS
- 15 Internal Interrupt Sources (with 6 External Interrupt Sources)
- 4 Reset Sources
- Power Down Wake-up Sources
  - On-chip power-on-reset
  - External reset
  - External interrupt 0/1/2/3/4/5
  - WDT interrupt or reset
- 2 operating modes : Active, STOP
  - Active current : Typ. 50mA @ 1.8V, 100Mhz
  - Stop current : Typ. 10uA @ 1.8V / Typ. 25uA @ 3.3V
- E.S.D. Protection up to
  - 2,000V
- Latch-up Protection Up to ±200mA
- Package
  - 44-MQFP
  - 32-QFN

1.3 Applications

- Home appliance: TV, Monitor, Home Theater
- Portable MP3, MP4
- Digital Cameras
- Battery power applications

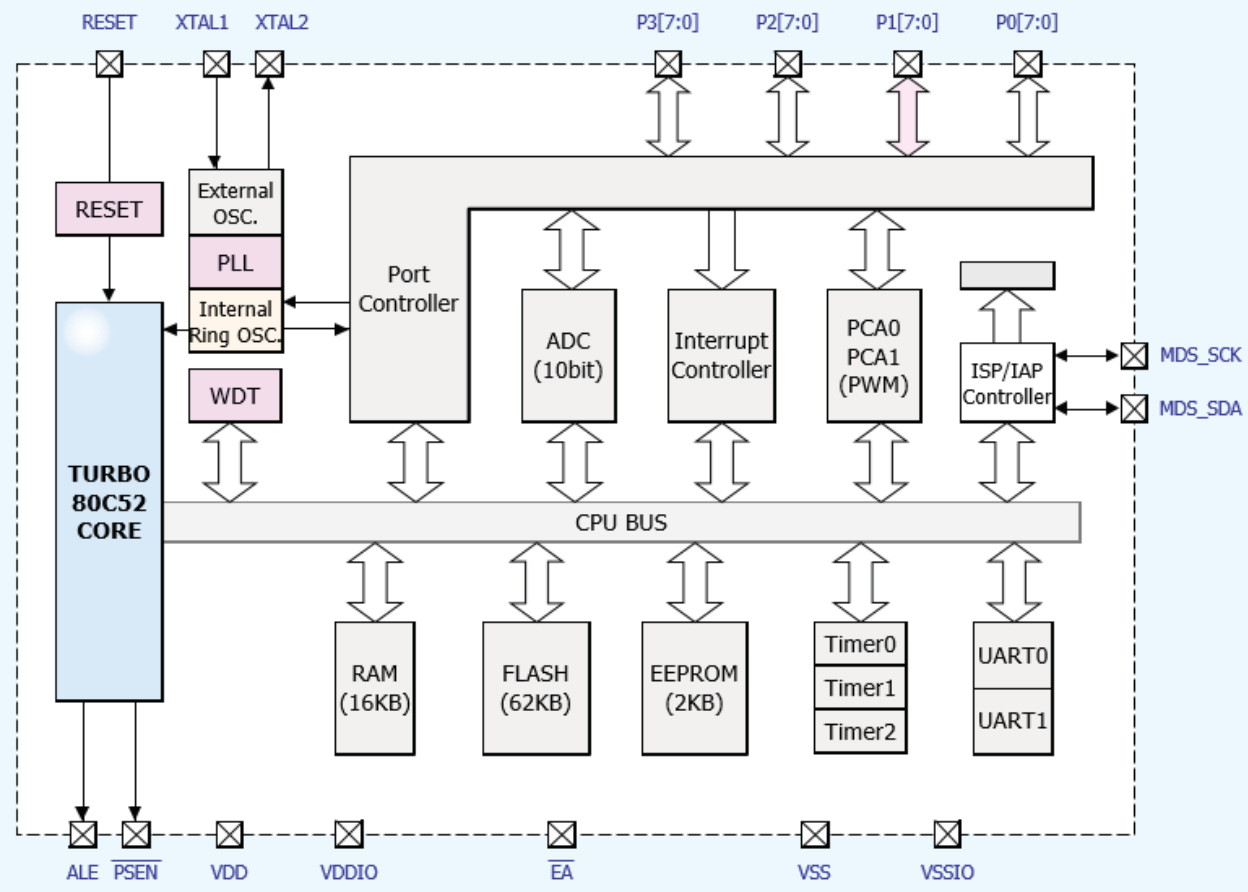
1.4 Product Family Guide

Product	Flash [Byte]	RAM [Byte]	ADC (bit X Ch)	PWM (bit X Ch)	Freq. (Mhz)	Package	Other Peripherals
GC89L591A0	64K (EEP. 2K)	16k +256	10 X 32	8x12 Or 16X6 8x6 Or 16X3	80	44-MQFP 32-QFN	3 T/C 2 UART WDT PLL ISP/IAP EJTAG LVD POR
GC89L581A0	32K (EEP. 2K)						
GC89L541A0	16K (EEP. 2K)						

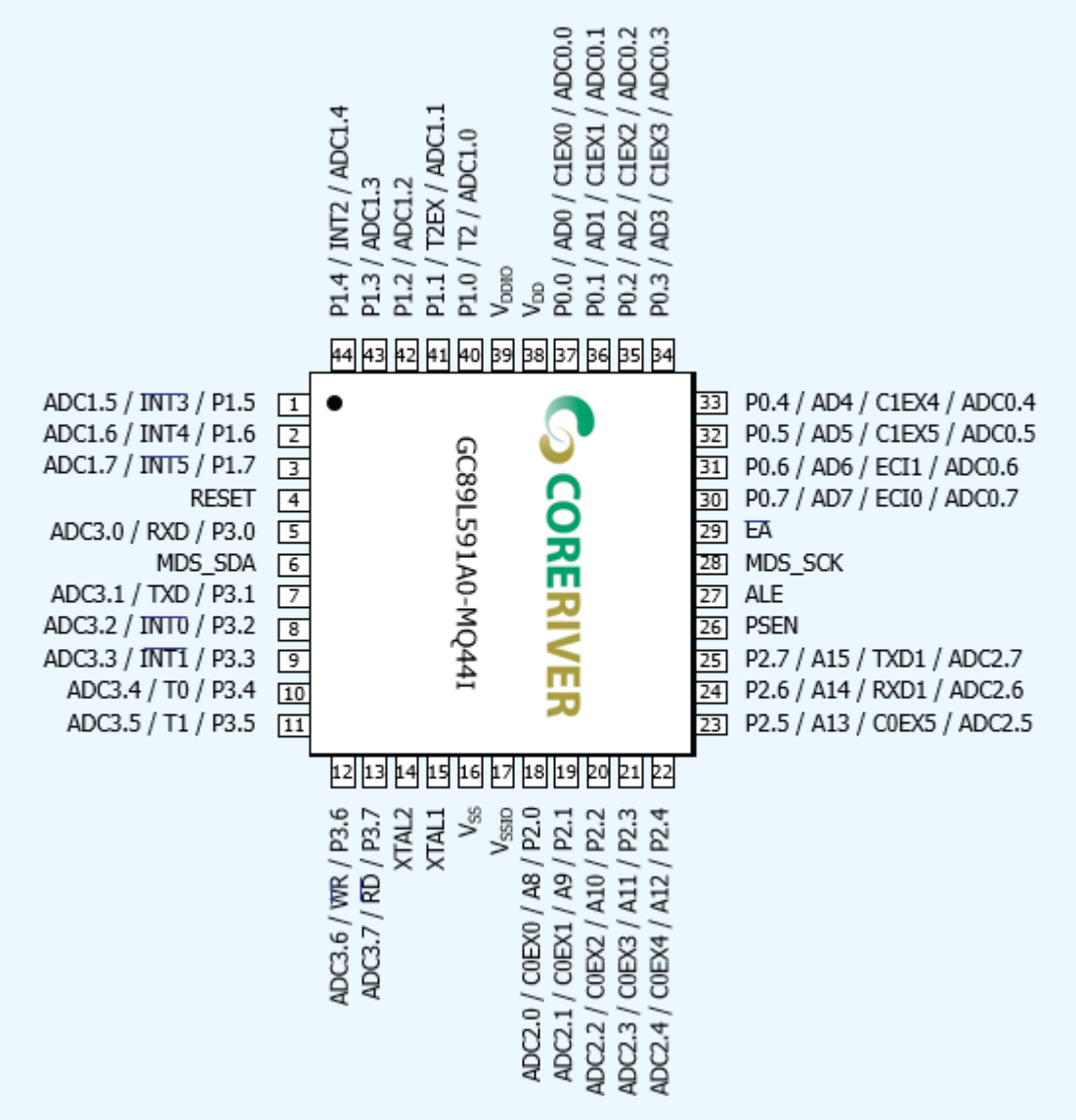
2 Block Diagram

Figure shows the block diagram of ***MiDAS3.0***. Programs reside in the internal program memory (Embedded Flash Memory). Data are read from or written to data memory (SRAM) or special function registers (SFRs).

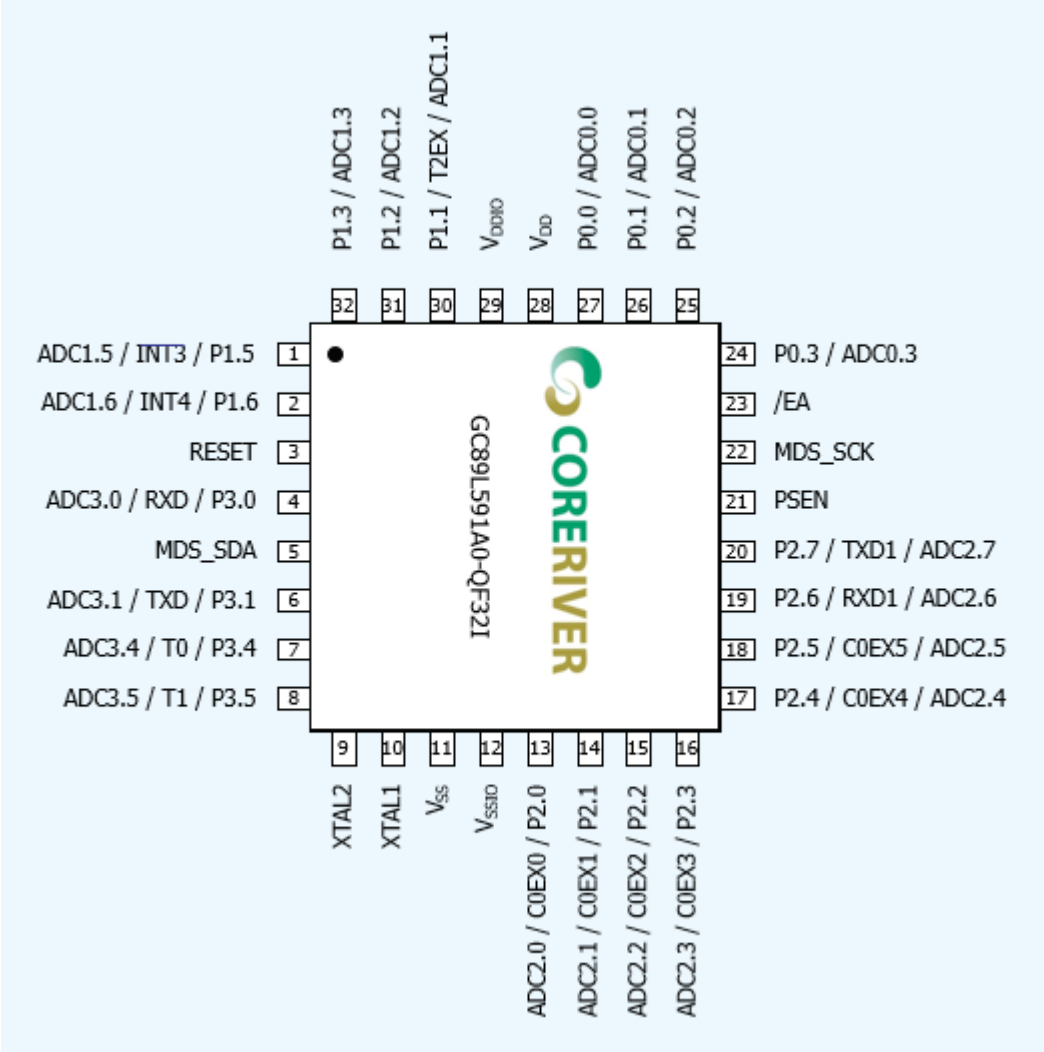
The internal registers of ***MiDAS3.0*** are configured as part of the on-chip RAM: therefore each register has an address. This is reasonable for ***MiDAS3.0***, since it has so many registers.



3 Pin Configuration



44-pin MQFP Package Diagram



32-pin QFN Package Diagram

4 Pin Description

Symbol	Direction	Description	Share Pins
VDD	Input	Power Supply	-
VDDIO	Input	IO Power Supply	-
VSS	Input	Ground	-
VSSIO	Input	IO Ground	-
RESET	Input	External Reset	-
XTAL1	Input	Input to the inverting Oscillator amplifier	-
XTAL2	Output	Output from the inverting Oscillator amplifier	-
/EA	Input	External ROM Access Enable (MiDAS3.0 family dose not use this pin.)	-
ALE	Output	Address Latch Enable (If ALEOFF is set, active only for external RAM access) This pin is also used for the parallel programming of FLASH memory.	-
PSEN	Input /Output	Program Strobe Enable. Pull-up. Used for Special Input only. (MiDAS3.0 does not support the code fetch from external ROM.)	-
MDS_SDA, MDS_SCK	Input /Output	I/O for ISP. The pull-up resistor is always switched on. This port is quasi-bidirectional.	-

Symbol	Direction	Description	Share Pins
P0[7:0]	Input /Output	●An 8-bit open-drain or push-pull I/O port or ADC Input(3.3V). 5V Tolerant Input. ●Note that the output is fully driven (push-pull) when P0 drives address/data to access external RAM or PCA1 drives output signals (C1EXn). • P0.0~P0.7 → AD0 ~ AD7:Low address or data input/output • P0.0~P0.5 → C1EX0 ~ C1EX5 for PCA1 • P0.6 → ECI1 for PCA1 • P0.7 → ECI0 for PCA0 • P0.0 → ADC0.0 : A/D converter Input 0 • P0.1 → ADC0.1 : A/D converter Input 1 • P0.2 → ADC0.2 : A/D converter Input 2 • P0.3 → ADC0.3 : A/D converter Input 3 • P0.4 → ADC0.4 : A/D converter Input 4 • P0.5 → ADC0.5 : A/D converter Input 5 • P0.6 → ADC0.6 : A/D converter Input 6 • P0.7 → ADC0.7 : A/D converter Input 7	P0.0/AD0/ADC0.1 / C1EX0 P0.1/AD1/ADC0.2 / C1EX1 P0.2/AD2/ADC0.3 / C1EX2 P0.3/AD3/ADC0.4 / C1EX3 P0.4/AD4/ADC0.5 / C1EX4 P0.5/AD5/ADC0.6 / C1EX5 P0.6/AD6/ADC0.7 / ECI1 P0.7/AD7/ADC0.8 / ECI0
P1[7:0]	Input /Output	●An 8-bit Quasi-bidirectional or push-pull I/O port or ADC Input(3.3V). 5V Tolerant Input. • P1.0 → T2 : External Input for Timer/Counter 2 • P1.1 → T2EX :Timer/Counter 2 Capture/Reload Trigger • P1.4 → INT2 : External Interrupt 2 (Positive Edge) • P1.5 → INT3 :External Interrupt 3 (Negative Edge) • P1.6 → INT4 : External Interrupt 4 (Positive Edge) • P1.7 → INT5 :External Interrupt 5 (Negative Edge) • P1.0 → ADC1.0 : A/D converter Input 8 • P1.1 → ADC1.1 : A/D converter Input 9 • P1.2 → ADC1.2 : A/D converter Input 10 • P1.3 → ADC1.3 : A/D converter Input 11 • P1.4 → ADC1.4 : A/D converter Input 12 • P1.5 → ADC1.5 : A/D converter Input 13 • P1.6 → ADC1.6 : A/D converter Input 14 • P1.7 → ADC1.7 : A/D converter Input 15	P1.0/T2/ADC1.0 P1.1/T2EX/ADC1.1 P1.2/ADC1.2 P1.3/ADC1.3 P1.4/INT2/ADC1.4 P1.5/INT3/ADC1.5 P1.6/INT4/ADC1.6 P1.7/INT5/ADC1.7

Symbol	Direction	Description	Share Pins
P2[7:0]	Input /Output	●An 8-bit Quasi-bidirectional or push-pull I/O port or ADC Input(3.3V). 5V Tolerant Input. ●Note that the output is fully driven (push-pull) when P2 drives the high byte of address to access external RAM or PCA0 drives output signals (C0EXn). • P2.0~P2.7 → AD8 ~ AD15 : High address output • P2.0~P2.5 → C0EX0 ~ C0EX5 for PCA0 • P2.6 → RXD1 : Serial Port 1 Output • P2.5 → TXD1 : Serial Port 1 Input • P2.0 → ADC2.0 : A/D converter Input 16 • P2.1 → ADC2.1 : A/D converter Input 17 • P2.2 → ADC2.2 : A/D converter Input 18 • P2.3 → ADC2.3 : A/D converter Input 19 • P2.4 → ADC2.4 : A/D converter Input 20 • P2.5 → ADC2.5 : A/D converter Input 21 • P2.6 → ADC2.6 : A/D converter Input 22 • P2.7 → ADC2.7 : A/D converter Input 23	P2.0/AD8/ADC2.0 / C0EX0 P2.1/AD9/ADC2.1 / C0EX1 P2.2/AD10/ADC2.2 / C0EX2 P2.3/AD11/ADC2.3 / C0EX3 P2.4/AD12/ADC2.4 / C0EX4 P2.5/AD13/ADC2.5 / C0EX5 P2.6/AD14/ADC2.6 / RXD1 P2.7/AD15/ADC2.7 / TXD1
P3[7:0]	Input /Output	●An 8-bit Quasi-bidirectional or push-pull I/O port or ADC Input(3.3V). 5V Tolerant Input. • P3.0 → RXD : Serial Port 0 Input • P3.1 → TXD : Serial Port 0 Output • P3.2 → INT0 : External Interrupt Input 0 • P3.3 → INT1 : External Interrupt Input 1 • P3.4 → T0 : Timer 0 External Input • P3.5 → T1 : Timer 1 External Input • P3.6 → WR : External Data Memory Writer Strobe • P3.7 → RD : External Data Memory Read Strobe • P3.0 → ADC3.0 : A/D converter Input 24 • P3.1 → ADC3.1 : A/D converter Input 25 • P3.2 → ADC3.2 : A/D converter Input 26 • P3.3 → ADC3.3 : A/D converter Input 27 • P3.4 → ADC3.4 : A/D converter Input 28 • P3.5 → ADC3.5 : A/D converter Input 29 • P3.6 → ADC3.6 : A/D converter Input 30 • P3.7 → ADC3.7 : A/D converter Input 31	P3.0/RXD/ADC3.0 P3.1/TXD/ADC3.1 P3.2/INT0/ADC3.2 P3.3/INT1/ADC3.3 P3.4/T0/ADC3.4 P3.5/T1/ADC3.5 P3.6/WR/ADC3.6 P3.7/RD/ADC3.7

5 Absolute Maximum Ratings

◈ **Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
V_{DD}	DC supply voltage	- 0.3 to 1.98	V
V_{DDIO}	DC IO supply voltage	- 0.3 to 3.6	V
V_{IN}	DC input voltage	-0.3 to 5.5	V
I_{IN}	DC input current	±10	mA
T_{STG}	Storage temperature	-40 to 125	°C

◈ **Recommended Operating Conditions**

Symbol	Parameter	Rating	Unit
V_{DD}	DC supply voltage	1.62 to 1.98	V
V_{DDIO}	DC IO supply voltage	3.0 to 3.6	V
T_A	Industrial temperature range	-20 to 85	°C

◈ Caution

When VDDIO use 3.3V Voltage and 5V input signal comes in input port, VDDIO Voltage Level will be able to change

VDDIO Voltage Level changed, Internal Functions will be able to wrong operation.

6 DC Characteristics

* T_A= -20°C ~ +85°C, V_{DDIO}=3.0V ~ 3.6V unless otherwise specified

Parameter	Symbol	Pin	Conditions	Value			Unit
				Min.	Typ.	Max.	
Input Low Voltage	V_{IL1}	RESETB,P0, P1,P2,P3	V_{DDIO} = 1.68V~3.6V	-0.5	-	0.2V_{DDIO}-0.1	V
Input high Voltage	V_{IH1}	P0, P1,P2,P3,RESETB	V_{DDIO} = 1.68V~3.6V	0.2V_{DDIO}+1.0	-	V_{DDIO}+0.5	V
Output Low Voltage	V_{OL}	ALL pin	I_{OL} = 20mA @V_{DDIO}=3.3V	-	-	0.3V_{DDIO}	V
Output High Voltage	V_{OH}	ALL pin	I_{OH} = -15mA @V_{DDIO}=3.3V	0.7V_{DDIO}	-	-	V
	V_{OHP}	Pull-up	I_{OH}= -10uA @V_{DDIO}=3.3V	0.7V_{DDIO}	-	-	V
Input Leakage Current	I_{IL}	All pins except XTAL1,XTAL2	V_{IN} = V_{IH} or V_{IL}	-	-	±1	μA
Pin Capacitance	C_{IO}	All	V_{DDIO} = 3.3V	-	10	-	pF

7 PLL Clock DC Characteristic

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Input Frequency	Fref	2	-	40	MHz	
Comparison Frequency	Fcomp	2	10	20	MHz	Fcomp=Fref / Rdiv
VCO Frequency	Fvco	70	100	130	MHz	Fvco = Ndiv * Fcomp
Output System clock Frequency	Fsys	8.75	-	100	MHz	Fsys = Fvco / Odiv

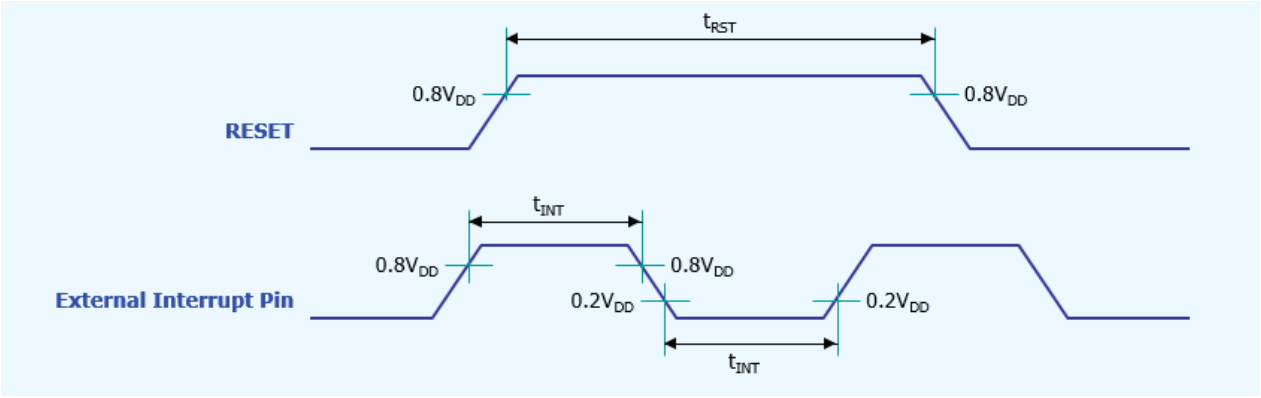
8 ADC Characteristic

Parameter		Symbol	Conditions	Value			Unit
				Min.	Typ.	Max.	
Supply Voltage		V_{DDADC}	-	1.68	-	3.3	V
Input Voltage		V_{INADC}	-	V_{SSIO}	-	V_{DDIO}	V
Resolution		RES_{ADC}	-	-	10	-	bit
Operating Frequency		F_{ADC}	V_{DDIO} = 3.0V ~ 3.6V V_{DDIO} = 1.68V ~ 1.92V	-	-	10 5	MHz
Conversion Time		t_{ADC}	-	-	96 / F_{ADC}	-	s
Overall Accuracy		OA_{ADC}	V_{DDIO} =3.3V, F_{ADC}=10MHz V_{DDIO} =1.8V, F_{ADC}=5MHz	-	±2	±4	LSB
Integral Nonlinearity		INL_{ADC}	V_{DDIO} =3.3V, F_{ADC}=10MHz V_{DDIO} =1.8V, F_{ADC}=5MHz	-	±2	±4	LSB
Differential Nonlinearity		DNL_{ADC}	V_{DDIO} =3.3V, F_{ADC}=10MHz V_{DDIO} =1.8V, F_{ADC}=5MHz	-	±0.5	±1	LSB
Zero Input Error		ZIE_{ADC}	V_{DDIO} =3.3V, F_{ADC}=10MHz V_{DDIO} =1.8V, F_{ADC}=5MHz	-	±2	±4	LSB
Full Scale Error		FSE_{ADC}	V_{DDIO} =3.3V, F_{ADC}=10MHz V_{DDIO} =1.8V, F_{ADC}=5MHz	-	±2	±4	LSB
Analog Input Capacitance		C_{INADC}	-	-	10	15	pF
ADC Current	Active	I_{ADC}	V_{DDIO} = 3.3V, F_{ADC}=10MHz	-	1	2	mA
			V_{DDIO} = 1.8V, F_{ADC}=5MHz	-	0.3	0.6	
	Power-down		V_{DDIO} = 3.3V	-	-	100	nA

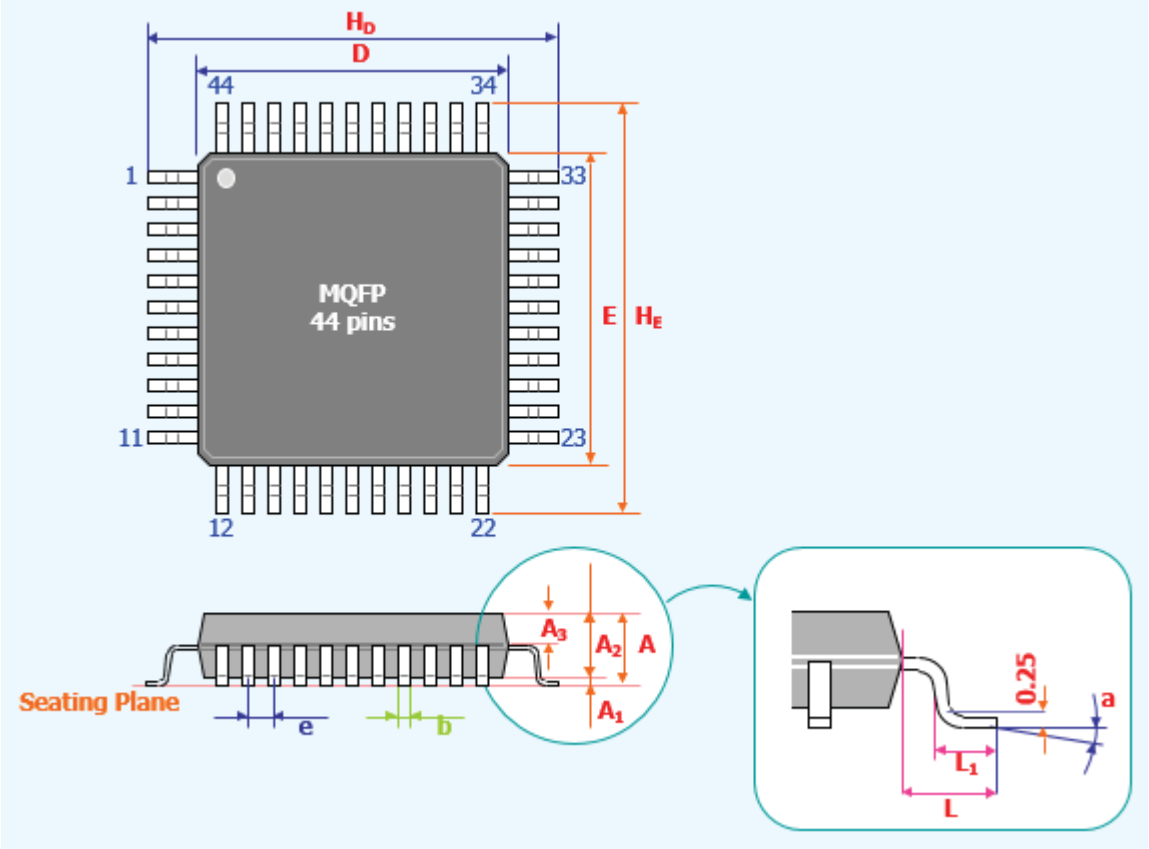
9 AC Characteristics

* T_A = -20 °C ~ +85 °C, V_{DDIO} = 3.0V ~ 3.6V unless otherwise specified

Parameter	Symbol	Pin	Conditions	Value			Unit
				Min.	Typ.	Max.	
Operating Frequency	F_{OSC}	XTAL1, XTAL2	V_{DDIO} = 3.3V ± 10%	-	-	40	MHz
RESET Input Width	t_{RST}	RESET	V_{DDIO} = 3.3V ± 10%	24	-	-	F_{OSC}
External Interrupt Input Width	t_{INT}	External Interrupt	V_{DDIO} = 3.3V ± 10%	4	-	-	F_{OSC}



10 44-pin MQFP Package Dimension



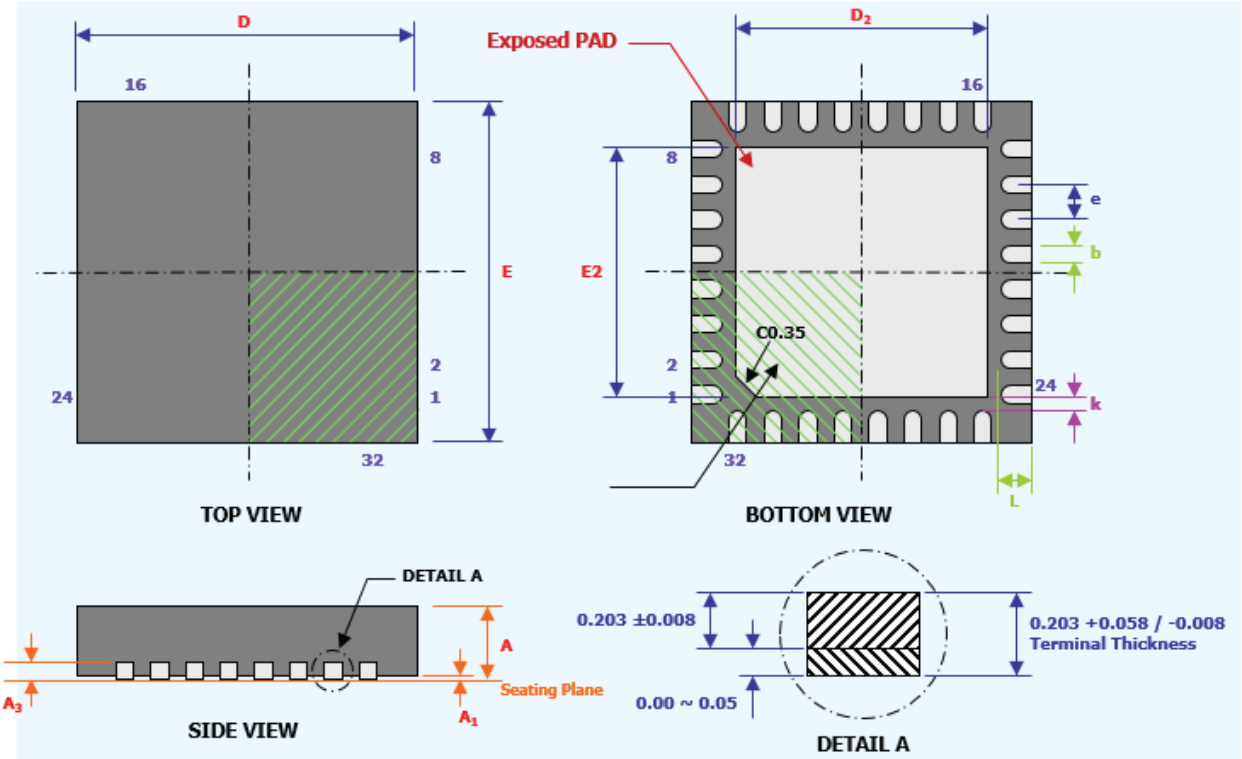
[44-MQFP]

Symbol	Dimension in Inches			Dimension in mm		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	-	-	0.091	-	-	2.30
A_1	0.002	0.004	0.006	0.05	0.10	0.15
A_2	0.079	0.083	0.087	2.00	2.10	2.20
A_3	0.035	0.039	0.043	0.90	1.00	1.10
b	0.011	-	0.015	0.29	-	0.37
D	0.386	0.394	0.402	9.80	10.00	10.20
E	0.386	0.394	0.402	9.80	10.00	10.20
e		0.031			0.80 BSC	
H_D	0.512	0.520	0.528	13.00	13.20	13.40
H_E	0.512	0.520	0.528	13.00	13.20	13.40
L	-	0.063BSC	-	-	1.60BSC	-
L_1	0.022	0.028	0.033	0.55	0.70	0.85
a	0°	-	8°	0°	-	8°

Notes:

1. Dimension D * E do not include interlead flash.
2. Controlling dimension: Inches
3. General appearance spec. should be based on final visual inspection spec.

11 32-pin QFN Package Dimension



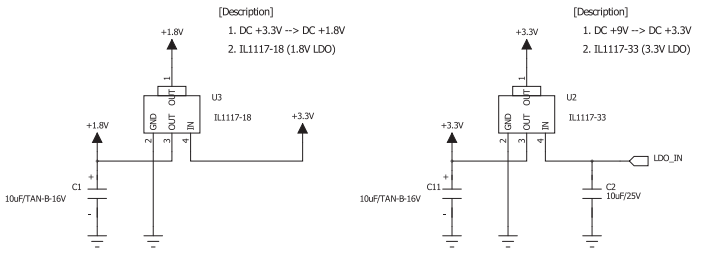
Symbol	Dimension in mm		
	Min.	Nom.	Max.
A	0.80	0.85	0.90
A_1	0.00	0.02	0.05
A_3		0.20 REF	
D		5.00 BSC	
E		5.00 BSC	
D_2	3.35	3.45	3.55
E_2	3.35	3.45	3.55
b	0.20	0.25	0.30
e		0.50 REF	
L	0.30	0.40	0.50
K	0.20	-	-

Notes:

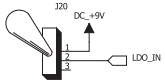
1. All Dimension are in mm. Angles in Degrees.
2. Pin 1 visual index feature may vary, but must be located within the hatched area.
4. Package is saw singulated.
5. Refer JEDEC MO-220.
6. BSC : Basic Dimension. Theoretically exact value shown without tolerances.
   REF : Reference Dimension, Usually without tolerance, for information purpose only.

REVISION RECORD			
LTR	ECO NO:	APPROVED:	DATE:

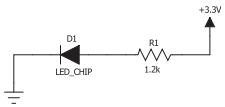
[LDO Part]



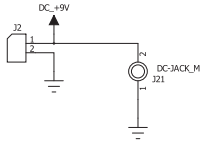
[Slide Switch]



[Power ON LED]

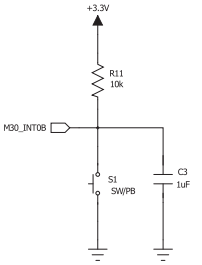


[DC Battery Port]



DC Jack is reserved.

[INT S/W]



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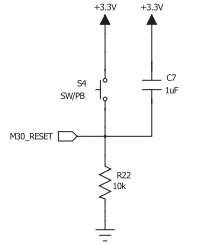
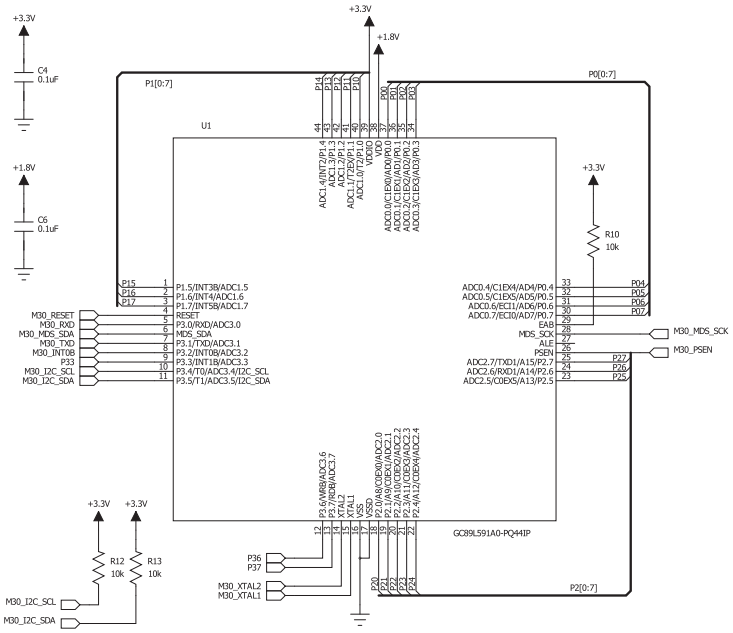
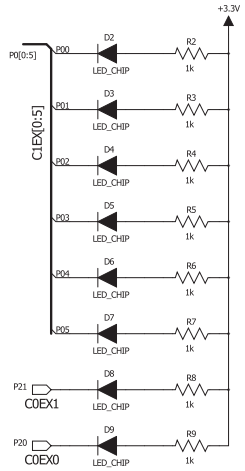


[MiDAS3.0, 44-PQFP]

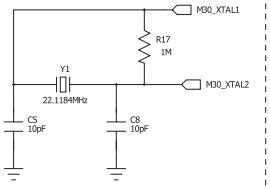
[Bypass Capacitor]



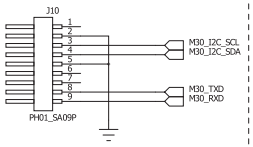
[LED Part]



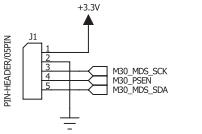
[External CLK]



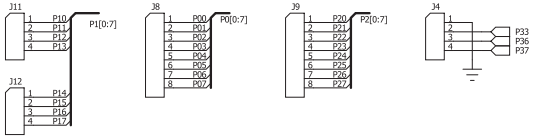
[Comm. I/F]



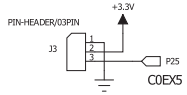
[ISP Download]



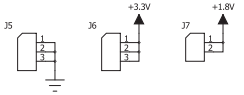
[GPIO Test Pins]



[Buzzer Pins]



[Power Pins]



[Related Design Files]

Design_MCU_KIT-DEMO_V3.0c_Demo_None_OnlyComm (FT232RL_mini_USB)
Design_MCU_GenWriter_Buzzer_Module_V1.0

Designed & Arranged by Prime Jee

DWN.	CHKD.	CHKD.	APPD.	TITLE	[MiDAS3.0] Simple Board		
				CODE NO.			
				MODEL NO.			
				SHEET	1 / 1	REV.	1.5a
CORERIVER Semiconductor				DATE	Wed., February 09, 2011		