New Mini-iTX Mainboard Specification White Paper

Ultra Compact Motherboard Form Factor with a New Level of Integration for the New Generation of Small Footprint Value PCs, Information Stations, & Digital PC Appliances

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1. Introduction

This document defines Mini-iTX, the IT industry's smallest form factor mainboard specification, developed by VIA Technologies, Inc. As part of the company's open industry-wide Total Connectivity initiative, the new VIA VT6010 Mini-iTX mainboard reference design enables the creation of an exciting new generation of small, ergonomic, innovative and affordable Value PC as well as Information Station and Information Server systems through its high level of integration and vastly reduced size of less than 50% the size of the FlexATX mainboard form factor. The new Mini-iTX mainboard comes with an onboard VIA C3™ E-Series EBGA processor that is renowned for its low power consumption and cool, quiet operation providing a noiseless and more ergonomic system.

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In addition to describing the main features and applications for Mini-iTX form factor motherboards, this document also includes information about the low power, fan less VIA C3™ E-Series EBGA processor to enable developers to fully evaluate the benefits of adopting this innovative new form factor.

2. Mini-iTX Motherboard Form Factor Overview

2.1 Mini-iTX Motherboard Form Factor Features and Benefits

The new Mini-iTX mainboard form factor provides motherboard makers, system integrators, and OEMs with a standardized ultra compact yet highly integrated platform that can be utilized across multiple Value PC, Information Station, Information Server, and Broadband Gateway product lines.

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With a footprint that measures just 17cm X 17cm, the new Mini-iTX motherboard form factor not only enables PC appliance designers to lower costs by reducing the size of the motherboard and the chassis, it also allows them to explore a huge variety of product development options - from compact space-saving sealed designs to fully functional Information Station and Value PC systems. This not only helps to drastically slash product design cycles, but also enables rapid innovation in system design to meet the changing needs of the market.

The versatility and cost-effectiveness of the Mini-iTX form factor is further enhanced by its highly integrated feature set that makes it, essentially, a system on a motherboard. In addition to an onboard VIA C3™ E-Series EBGA processor and AGP graphics and audio support, the Mini-iTX also comes with advanced Ethernet networking, SPDIF 5.1 audio channels and TV Out features that are not available on other small form factor motherboards. The VIA C3™ processor has the smallest x86 processor die size which results in its ultra low power consumption that allows the use of passive cooling to further enhance the benefits of modern form factor designs by making them smaller, quieter and more environmentally friendly.

Table 1 provides a summary of the main features and benefits of the Mini-iTX motherboard form factor:

Table 1 Mini-iTX Motherboard Feature & Benefit Summary

Feature	Benefit
Small 17cm x 17cm board size	• Enables small footprint system designs • Reduces overall system costs
Rich I/O Integration	• Support for complete range of I/O standards, including USB, TV Out, 10/100Mbps Ethernet etc… • Reduces overall system costs
Integrated AGP graphics and audio	• High quality multimedia performance • Reduces overall system costs
VIA C3™ E-Series processor	• Ultra low power consumption • Passive (fanless) cooling • Enables more compact system designs
Slimline 50W Power supply	• Saves system space • Enables fanless silent PC designs due to its low heat characteristics • Reduces overall system costs • Enhances reliability

2.2 Mini-iTX Product Applications

The new Mini-iTX motherboard form factor has been specifically designed for integration in small footprint chassis, including a growing number of Information PC and Information Station reference systems. It can also be mounted in a standard FlexATX and MicroATX chasses in which modifications have been made to the chassis mounting hole positions.

Figure 1 Information PC

The Information PC reference design is a small, quiet and inexpensive entry-level computing platform spanning price points from US$199 to US$399. It is optimised for mainstream Internet applications and services as well as common productivity, education, storage and entertainment applications. The Information PC is fully compatible with standard x86 hardware and software, thus offering the advantage of flexibility, connectivity, upgradeability and, with the VIA C3™ processor, quiet operation.

Figure 2 Information Station

The Information Station reference design provides a small, silent and affordable platform for devices that convert a television into an interactive multimedia box capable of surfing the web, playing DVDs and running common productivity applications.

2.3 Mini-iTX Board Dimensions

Table 2 below compares the dimensions of the Mini-iTX with those of other ATX form factors. As can be seen, the Mini-iTX is the smallest available form factor on the market measuring more than 50% smaller than the FlexATX form factor.

Table 2 Mini-iTX & ATX Motherboard Board Dimensions Comparison Chart

Form Factor	Maximum Allowable Width	Maximum Allowable Depth	% Smaller
Mini-iTX	**170mm**	**170mm**	
iTX	215mm	191mm	more than 42%
FlexATX	229mm	191mm	more than 51%
Mini ATX	284mm	208mm	more than 104%
MicroATX	244mm	244mm	more than 106%
ATX, full-size	305mm	244mm	**more than 157%**

2.4 Mini-iTX Chassis Mounting

The Mini-iTX form factor was designed specifically for small footprint appliances such as the Information PC or Set Top Box currently being promoted by VIA Technologies, Inc. Mounting Mini-iTX motherboards in a standard FlexATX or MicroATX chassis is also possible with modifications to the chassis hole mounting positions.

2.5 Mini-iTX Power Specifications

The Mini-iTX compliant power supply is designed with several space, energy and noise reduction features in mind. The typical physical dimensions (see table below) are very compact compared to other standard power supplies such as ATX. The options of AC 100 – 240V and 50 – 60Hz auto switching are fully supported.

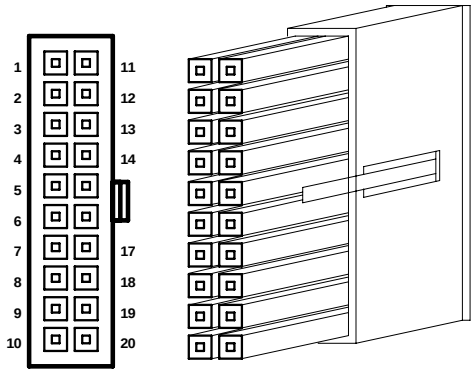
Table 3 Power Supply Size Comparisons

Power Supply	Length	Width	Height	Total Area % smaller
iTX, Mini-iTX	**174 mm**	**73mm**	**55 mm**	
ATX	140 mm	150 mm	86 mm	150%

2.6 Mini-iTX Power Supply Connector

The Mini-iTX power specification uses an industry standard 20-pin main connector to the power supply as shown in Figure 3.

Figure 3 20-pin Mini-iTX Power Supply Connector



1	+3V	**11**	+3V
2	+3V	**12**	NC
3	Gnd	**13**	Gnd
4	+5V	**14**	PWR_ON-
5	Gnd	**15**	Gnd
6	+5V	**16**	Gnd
7	Gnd	**17**	Gnd
8	PWR_GD	**18**	NC
9	5V_SB	**19**	+5V
10	+12V	20	+5V

Note: NC = no connection

Table 4 Mini-iTX Switching Power Supply DC Output

Output Voltage	Load Range		Peak 3 Sec.	Voltage Tolerance	Ripple & Noise (p-p)	Over Voltage Protection
	Min.	**Max.**				
5V_SB	0.1A	1.5A	2.0A	±5%	150mV	6.5V
+3V	0.1A	1.0A	1.5A	±5%	100mV	3.8V
+5V	0.1A	6.0A	7.0A	±5%	100mV	6.5V
+12V	0.1A	0.5A	0.8A	±8%	200mV	15.6V
Total Power: Max 47W, Peak 60W						

The onboard VIA C3™ E-Series processor leverages its small die size and highly efficient architectural design to deliver power consumption to below one watt when running in optimized low voltage mode.

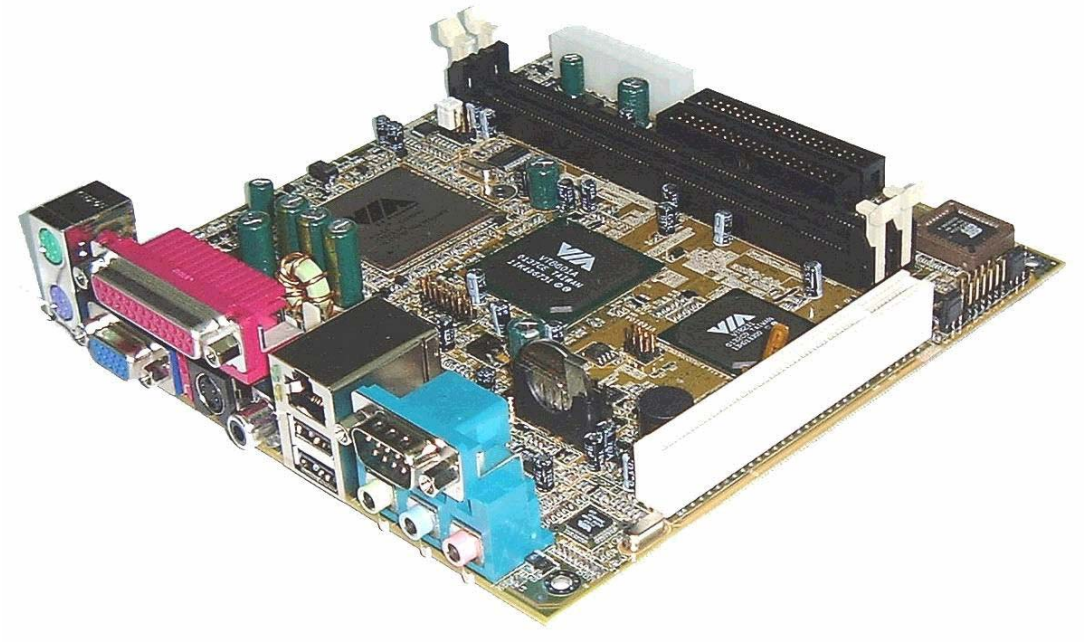
3. VIA VT6010 Mini-iTX Reference Board

3.1 VIA VT6010 Mini-iTX Reference Board Overview

The VIA VT6010 Mini-iTX reference board design provides developers with a standard platform for designing and building truly cost effective, ultra compact, scalable mainboards incorporating a myriad of features not previously possible using such a small form factor.

Featuring on the VIA C3™ E-Series EBGA processor, the Mini-iTX reference board is built around the highly integrated VIA Apollo PLE133 chipset and also features two DIMMs, two EIDE connectors, one PCI slot supporting up to 2 PCI devices, onboard TV Out and 10/100Mbps Ethernet to provide a highly flexible and cost effective platform that can be scaled to meet a range of product requirements and feature sets.

Figure 4 The VIA VT6010 Mini-iTX Reference Board



3.2 VIA VT6010 Mini-iTX Reference Motherboard Specification Overview

Table 5 summarizes the main features implemented on the VIA VT6010 Mini-iTX reference motherboard.

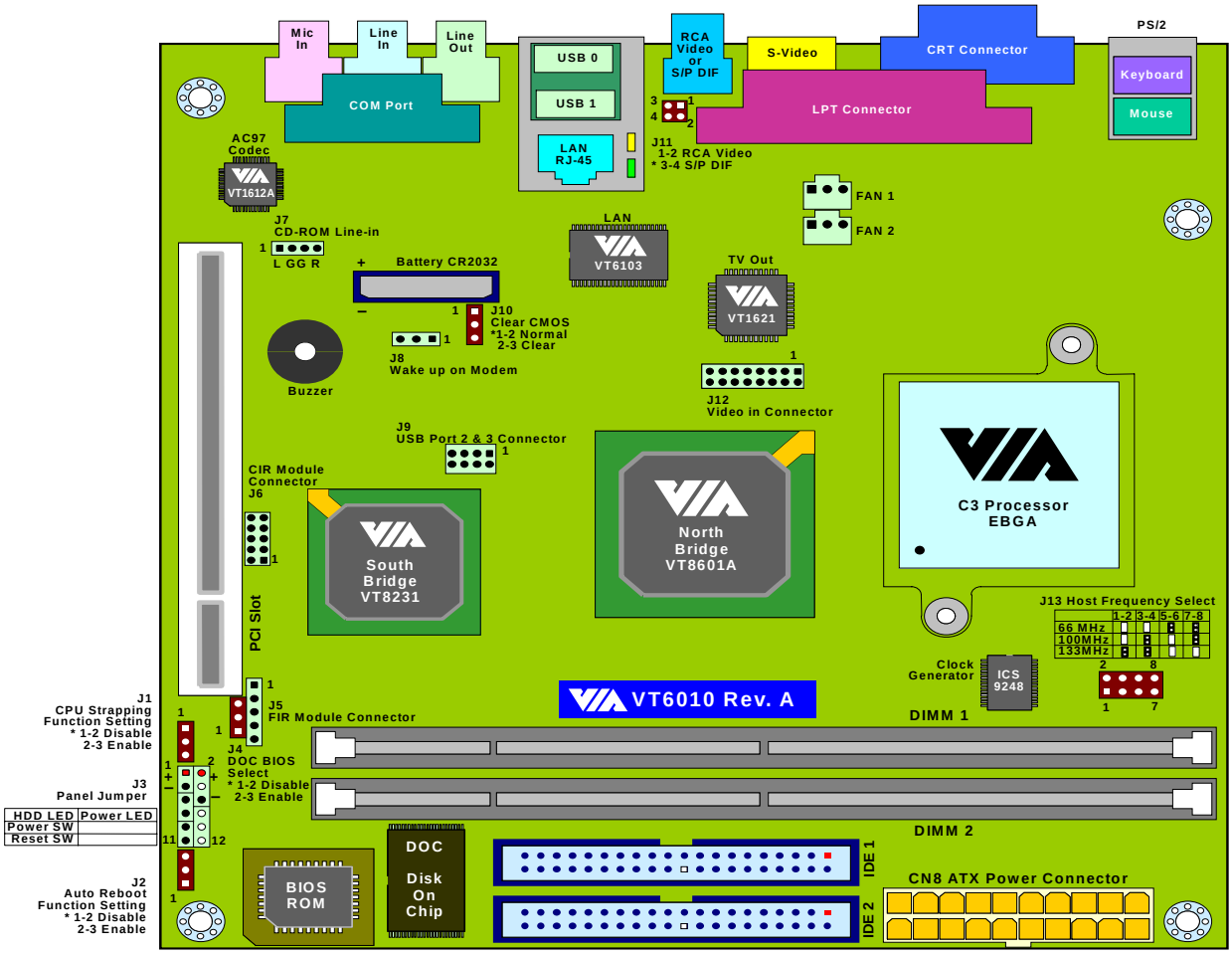
Table 5 VT6010 Mini-iTX Reference Motherboard Specifications

Item	Description
Processor	VIA C3™ processor • VIA C3™ processor (EBGA package) up to 800MHz • 128K L1 and 64K L2 cache
Core Logic	• VIA Apollo PLE133: North Bridge (VT8601A) • South Bridge (VT8231)
Main Memory	• Two 168-pin DIMM memory sockets • PC100/133 SDRAM support
Graphics	• Integrated AGP2X with 2D/3D Graphics Acceleration • Motion Compensation for DVD playback • VIP port for video overlay function
Storage (ATA)	• Two ATA 33/66/100 IDE connectors • 8/16/32MB DOM or standard 2.5”/3.5” HDD • CD-ROM or DVD drive
Storage (Flash)	• DOC Flash memory (8MB ~ 32MB) on board
Audio System	VIA VT1612A • 3 Audio Jacks - Line-Out, Line-In and Microphone-In • Sound Blaster, Sound Blaster Pro Compatible • Digital I/O compatible with consumer mode S/PDIF
Ethernet (LAN)	VIA VT6103 • 10/100Mbps Ethernet MAC integrated 9 • 10/100Mbps Ethernet PHY VT6103 on board
TV Out	VIA VT1621 • Integrated Macro Vision 7.01 • High quality scaling and filtering • S-Video or Composite video output • Support NTSC/PAL TV
I/O Ports	• 3 Audio Jacks – Line-out, Mic-in and Line-in • Four USB ports (two USB ports located at rear side) • One EPP/ECP parallel port • One 16C550 compatible serial port • Two External PS/2 Compatible Keyboard /Mouse ports • Two TV output ports (S-Video or optional RCA TV out) • One S/PDIF out (optional and multiplex with RCA TV out) • One RJ45 port • One PCI slot (Note: support for two PCI devices)
Other Optional Modules	• SIR/FIR sensor • CIR sensor and controller • Cable for 2nd PCI device

3.3 VT6010 Mini-iTX Reference Board Layout

Figure 5 outlines the basic placement of components on the VT6010 Mini-iTX reference board layout.

Figure 5 VT6010 Mini-iTX Reference Board PCB Layout



3.4 VIA VT6010 Mini-iTX Reference Board Power Requirements

The VIA VT6010 supports both iTX and ATX compliant power supplies.

4. Contacts

For more information on the Mini-iTX form factor specification, the VIA VT6010 reference motherboard or the VIA C3™ processor, please contact VIA Technologies, Inc. at mkt@via.com.tw or access the VIA corporate website at www.viatech.com.