



# AMD-K6<sup>®</sup> Processor Family Motherboard Requirements

## Electrical

**Socket Compatibility:** All AMD-K6<sup>®</sup> family processors are compatible with the standard 321-pin Socket 7. Motherboards should be designed to support Socket 7 signal definitions including dual voltage power and ground assignments.

**Auto Voltage Detect:** Two signals are provided on AMD-K6 family processors to allow motherboards to autodetect the proper CPU voltage: VCC2DET (pin AL01) and VCC2H/L# (pin AN05). VCC2DET low indicates a processor that requires a dual voltage supply, separating the V<sub>CC2</sub> and V<sub>CC3</sub> voltage planes. All members of the AMD-K6 family of processors support this signal. VCC2H/L# allows the motherboard logic to differentiate between .35 micron (Model 6) AMD-K6 processors from .25 micron parts (Model 7 and above). VCC2H/L# low indicates a .25 micron part, requiring 2.2V on V<sub>CC2</sub>; VCC2H/L# high indicates a .35 micron part which may require 2.9V or 3.2V on V<sub>CC2</sub>. Pin AN05 is an internal no-connect (INC) on AMD-K5 and AMD-K6 Model 6 processors. To prevent system logic from misinterpreting this floating INC pin as a low, motherboards with system logic that samples VCC2H/L# must incorporate a weak pull-up resistor for this signal. Some system implementations may meet the VCC2H/L# pull-up requirement by design.

**V<sub>CC3</sub> Special Requirements:** Please note that the AMD-K6/300 (model 7) processor requires a unique operating voltage on V<sub>CC3</sub> Pin-U33. The requirement for this pin is 3.45V +/-150mV. To minimize design changes, AMD recommends setting all V<sub>CC3</sub> pins to 3.45V ± 150mV. Motherboards with this modification will still support all other AMD-K6 processors. As a design alternative, an isolated voltage supply of 3.45V +/-150mV can be supplied directly to Pin-U33 (max current for Pin-U33 is approximately 25mA).

**V<sub>CC2</sub> Voltage Regulation:** Support for all current members of the AMD-K6 family of microprocessors requires a 10A voltage regulator solution. Additional amperage may be required by the chipset or cache. Sufficient bulk and decoupling capacitance must be present to maintain the specified voltage range under all operating conditions. Future members of the AMD-K6 family are expected to exceed the 10A requirement, therefore AMD recommends using a 15A voltage regulator solution on new motherboard designs. To allow maximum flexibility in supporting new processors, AMD also recommends the use of 4 or 5-bit programmable voltage regulator solutions for the processor core voltage.

For further design recommendations, please refer to the *AMD-K6 Processor Power Supply Application Note, order# 21103*, and *AMD-K6 Processor V<sub>CC2</sub> Voltage Detection Application Note, order# 21635*.

	Model	V <sub>CC2</sub> (core voltage)	V <sub>CC3</sub> (I/O voltage)	I <sub>CC2</sub> Max. (core)	I <sub>CC3</sub> Max. (I/O)	Typical Power	Thermal Max. Power
AMD-K6-166	6	2.9V ± 145mV	3.3V +300mV/-165mV	6.25 A	0.48 A	10.3 W	17.2 W
AMD-K6-200	6	2.9V ± 145mV	3.3V +300mV/-165mV	7.50 A	0.50 A	12.0 W	20.0 W
AMD-K6-233	6	3.2V ± 100mV	3.3V +300mV/-165mV	9.50 A	0.52 A	17.0 W	28.3 W
AMD-K6/233	7	2.2V ± 100mV	3.3V +300mV/-165mV	6.5 A	0.52 A	8.10 W	13.5 W
AMD-K6/266	7	2.2V ± 100mV	3.3V +300mV/-165mV	7.05 A	0.54 A	8.75 W	14.55 W
AMD-K6/300	7	2.2V ± 100mV	3.45V ± 150mV	7.49 A	0.56 A	9.25 W	15.4 W
AMD-K6-2/266	8	2.2V ± 100mV	3.3V +300mV/-165mV	7.35 A	0.54 A	8.85 W	14.70 W
AMD-K6-2/300	8	2.2V ± 100mV	3.3V +300mV/-165mV	8.45 A	0.56 A	10.35 W	17.20 W
AMD-K6-2/333	8	2.2V ± 100mV	3.3V +300mV/-165mV	9.40 A	0.58 A	11.40 W	19.00 W
AMD-K6-2/350	8	2.2V ± 100mV	3.3V +300mV/-165mV	9.85 A	0.60 A	11.98 W	19.95 W

## **Bus Frequency/Clock Multiplier**

The internal clock frequency of AMD-K6 family processors are driven as a multiple of the CPU bus frequency. This multiple is defined by BF0 (Y33), BF1 (X34), and BF2 (W35) pins, each of which contains an internal pull-up. Model 6 & 7 AMD-K6 processors support a 66MHz CPU bus. AMD-K6-2 processors support 66 MHz, 95 MHz, and 100 MHz CPU bus speeds.

	<b>BF0 (pin Y33)</b>	<b>BF1 (pin X34)</b>	<b>BF2 (pin W35)</b>	<b>CPU Bus Speed</b>
<b>AMD-K6/166</b>	Low	Low	High	66 MHz
<b>AMD-K6/200</b>	High	Low	High	66 MHz
<b>AMD-K6/233</b>	High	High	High	66 MHz
<b>AMD-K6/266</b>	Low	High	Low	66 MHz
<b>AMD-K6/300</b>	Low	Low	Low	66 MHz
<b>AMD-K6-2/266</b>	Low	High	Low	66 MHz
<b>AMD-K6-2/300</b>	High	Low	High	100 MHz
<b>AMD-K6-2/333</b>	High	High	High	95 MHz
<b>AMD-K6-2/350</b>	High	High	High	100 MHz

## **BIOS**

The following items are required to make a BIOS AMD-K6 processor ready:

- Recognize the “AuthenticAMD” string returned by CPUID function 0.
- Recognize and interpret the Instruction Family, Model, and Feature bits returned by CPUID functions 1 and 8000\_0001h.
- Ensure that all MSR’s for each member of the AMD-K6 family processors are properly configured, including UWCCR, EFER, and WHCR. Verify that only MSR’s supported by the AMD-K6 processor are used in the BIOS.
- Verify that SMM routines do not rely on Intel reserved areas of SMM Save State Area. The AMD-K6 family processors may have differences in this area.
- Update processor speed reporting algorithms using the TSC (Time Stamp Counter) & RTC (Real Time Clock) to properly identify the operating frequency.
- Display the recommended boot string (“xxx” indicates frequency):

<b>CPUID</b>	<b>Recommended Boot String</b>
056	AMD-K6(tm)/xxx
057	AMD-K6(tm)/xxx
058	AMD-K6-2(tm)/xxx

Complete details on implementing BIOS support for the AMD-K6 processor family are available in the *AMD-K6 Processor BIOS Design Application Note, order# 21329*.