EPSON

32-Bit RISC Microcontroller

Core Description

- Low Power 32-Bit Single RISC Core
- C-Code optimised
- MAC Instruction (2 cycles)
- Up to 256 MB memory
- 218 Interrupts
- DRAM Controller included
- Supports DRAM/EDO-RAM and Burst ROM
- Sixteen 32-Bit General Purpose Registers
- Little/Big Endian format
- Havard Architecture

ENERGY SAVING EPSON

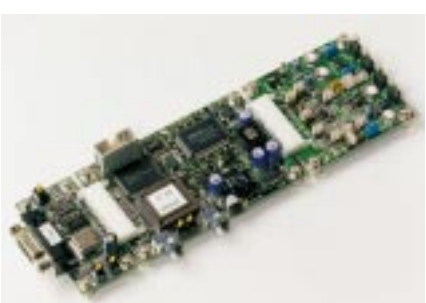
EPSON 32-Bit RISC Controller Family

Product Table

Model No.	Operation Voltage		Current Consumption			Clock	Memory				DMA
	Core 3.3V	I/O 5V	Executing OSC3: 50MHz,3.3V(typ.)	HALT 20MHz, 3.3V(typ.)	SLEEP 3.3V(typ.)	frequency max.	ROM (code)	Intern	Extern	Type	Channel
E0C33A104	3.3V	5V	400mW(OSC3: 33MHz,5V)	12µW(OSC1: 32.768kHz,5V)	1µW	33MHz	ext.	2k + (4k ARAM)	256MB	DRAM/SRAM/EDO	130
E0C33202	1.8V–3.6V	1.8V–5.5V	215mW	40mW	4µW	60MHz	ext.	2k	256MB	DRAM/SRAM/EDO	132
E0C33204	1.8V–3.6V	1.8V–5.5V	215mW	40mW	4µW	60MHz	ext.	4k	256MB	DRAM/SRAM/EDO	132
E0C33209	1.8V–3.6V	1.8V–5.5V	215mW	40mW	4µW	60MHz	ext.	8k	256MB	DRAM/SRAM/EDO	132
E0C332S08	1.8V–3.6V	1.8V–5.5V	TBDmW	TBDµW	TBDµW	60MHz	ext.	8k	256MB	DRAM/SRAM	no
E0C33264 E0C332129	1.8V–3.6V	1.8V–5.5V	TBDmW	TBDµW	TBDµW	50MHz	ext. 128k	8k	256MB	DRAM/SRAM/EDO	132
E0C332L01	1.8V–3.6V	1.8V–5.5V	230mW	43mW	4µW	50MHz	128k	8k + (40kVRAM)	256MB	DRAM/SRAM/EDO	132
E0C332L02[1]	1.8V–3.6V	1.8V–5.5V	TBDmW	TBDµW	TBDµW	50MHz	ext.	8k	256MB	DRAM/SRAM/EDO	132
E0C332T01[1]	1.8V–3.6V	1.8V–5.5V	TBDmW	TBDµW	TBDµW	60MHz	ext.	8k	256MB	DRAM/SRAM/EDO	132
E0C332F128[1]	2.7V–3.6V	2.7V–5.5V	TBDmW	TBDµW	TBDµW	50MHz	128kB Flash	8k	256MB	DRAM/SRAM/EDO	132

[1] under development

The E0C33000 Core has a high-code efficient instruction set including MAC (multiplication and accumulation instruction) featuring high-speed operation and very low power consumption. It is suitable for a wide range of embedded applications such as portable equipment, OA and FA equipment, digital signal processing systems (low cost DSP substitution) and all other mobile applications requiring a fast and powerful 32-Bit performance at low power.



Firmware Libraries

JPEG33 - JPEG image compression and decompression middleware

- PC Tools to convert a JPEG compressed image into ROM data
- Support Monochrome, RGB, YUV image processing function

Function	Description
jpgDataEncode()	JPEG compresses color image
jpgGryDataEncode()	JPEG compresses grayscale image
jpgDataDecode()	JPEG expands color images
jpgGryDecode()	JPEG expands grayscale image
etc.	

VRE33 – voice recognition engine middleware

- Speech recognition engine (speaker independent/ dependent recognition)
- Real-time execution (20…100 words)
- PC tools for preparing speech recognition ROM data

Function	Description
VreRecognise()	Recognises speech in real-time
VreRecogInit()	Initialises processing for rejection
VreMakeDictionary()	Acquires characteristics data from input speech
mpmRecognition()	Compares characteristics data and dictionary data
etc.	

Melody33 – melody playing middleware

- Supports PWM Method (similar to general melody IC's)
- Max. 3 channel simultaneous outputs
- Compact data max. 2 Byte per note

Function	Description
mdyOpen()	Starts melody output
mdyClose()	Stop melody output
mdyBreak()	temporary break of the sound output
etc.	

	Interrupts		I/O Ports			Peripheral									Special Features	Package
						Timer				Serial			Converter			
ls	Internal	External	I - Lines	O - Lines	I/O - Lines	8-Bit	16-Bit	WT	RTC	IrDA1.0	UART	SPI	D/A	D/A		
	39	6	13	11	15	4	6	yes	1	yes	yes	2	2x8-Bit	8x10-Bit	High speed DMA, A/D and D/A converter, wide firmware support	QFP5-128 QFP15-128
	29	10	13	–	29	4	6	yes	1	yes	yes	4	–	8x10-Bit	High speed DMA, wide firmware support, 4 ch. SIO	QFP5-128/ Die / QFP15-128
	29	10	13	–	29	4	6	yes	1	yes	yes	4	–	8x10-Bit	High speed DMA, wide firmware support, 4 ch. SIO	QFP5-128/ Die / QFP15-128
	29	10	13	–	29	4	6	yes	1	yes	yes	4	–	8x10-Bit	High speed DMA, wide firmware support, 4 ch. SIO	QFP5-128/ Die / QFP15-128
	23	8	no	–	29	4	6	yes	1	yes	yes	2	–	–	shrink version of E0C33209, wide firmware support	QFP15-100
	29	10	13	–	29	4	6	yes	1	yes	yes	2	–	8x10-Bit	wide firmware support, int. ROM version of E0C33209, High speed DMA	QFP5-128
	29	6	13	–	29	4	6	yes	1	yes	yes	2	–	8x10-Bit	emb. LCD Controller SED1374, int. 40kVRAM High speed DMA, wide firmware support	QFP18-176
	29	6	13	–	29	4	6	yes	1	yes	yes	4	–	8x10-Bit	emb. LCD Controller SED1353, High speed DMA, MMU	QFP18-176 Die
	29	6	13	–	69	6	10	yes	1	yes	yes	6	–	8x10-Bit	High speed DMA, 2ch. I2C, wide firmware support	QFP18-176
	29	10	13	–	29	4	6	yes	1	yes	yes	2	–	8x10-Bit	Flash memory, emb. user logic FPGA, 35k gates High speed DMA, wide firmware support	QFP5-128

VOX33 – voice compression and decompression middleware

- Voice compression, decompression, speech and pitch change supported
- VSC voice processing technology, Real-time execution (voice changer)
- Supports PCM and ADPCM (40 kbps, 32 kbps, 24 kbps and 16 kbps)

Function	Description
AdpcmSpeak()	expands and reproduces ADPCM data
AdpcmListen()	compresses and records ADPCM data
vsxSpeak()	expands and reproduces VSX data
vsxListen()	compresses and records VSX data
pcmSpeak()	expands and reproduces PCM data
pcmListen()	compresses and records PCM data
etc.	

SOUND33 – sound playing middleware

- Sound playing musical instruments (wave table method)
- 16 Ch/20 MHz 32 Ch/40 MHz playable in Real-time
- Outputs 8 KHz sounds, compact data max. 3 Byte per note, instrument data: 4 k…8 k per instrument

Function	Description
sndSpeak ()	Expands and reproduces ADPCM data
etc.	

CF33 - compact flash middleware

- Interface with memory cards based on the PCMCIA ver. 2.0 socket service and card service
- The ATA driver enables to use the CampactFlash, ATA flash memory cards and memory card or drive with ATA interface as MicroDrive
- The FAT file system driver enables to exchange files compatible with MS-Dos ver. 6.x.

Function	Description
cfFatinit	initialise FAT file system driver
cfCHdir	change current directory
cfCSinit	initialise Card service
cfPcicinterrruptHandler	PCMCIA controller interrupt process

GRAPHIC33 - graphic library middleware

- Supports various grayscales, from 1, 2, 4 or 8 bpp color or monochrome
- User interface resources required for GUI implementation
- Allows advance evaluation using emulation library on a PC
- Fast and compact library

Function	Description
gpcDrawPoint	Draws a point
gpcDrawRect	Draws a rectangle
gpcFillEllipse	Fills an Ellipse
gpcDrawText	Outputs text
gpcGetImage	Captures an Image

Software Tools

C33 – GNU C Compiler

- C Compiler (optimised)
- C and Assembly Source Level Debugger with Simulator Function
- Support of Windows9X GUI

ROS33 – Real Time Operation System

- Supports µITRON 3.0 level R/Level S
- Tasks: 1…255 – Semaphores: 1…255 – Mailboxes: 1…255
- Dispatch Time typ. 7.84 µs
  Interrupt Response Time typ. 4.3 µs (at 33 MHz)

EPSON 32-Bit RISC Controller Family

Development Tools for EPSON Middleware

EPSON provides an evaluation board, which offers the opportunity to evaluate different firmware libraries (VRE33, VOX33, etc.). The complete unit consists of 3 parts: DMT33MON, DMT33004/5/6/7/8 and DMT33AMP1/2/3.

DMT33MON

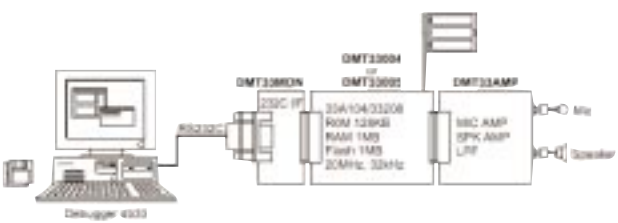
The DMT33004/5 onboard ROM includes the MON33 debug monitor. It provides debugging functions, such as down of programms to the RAM or FLASH memory, running, stepping, setting breaks with the DMT33MON board and the db33 debugger on the PC.

DMT33004/5/6/7/8

The DMT33004/5/6/7/8 is the evaluation board for the E0C33A104 and E0C3320x. The DMT Board supports stand alone function due to the FLASH and RAM Memory. It contains 128 KB ROM (Monitor MON33), 1 MB RAM, 1 MB Flash memory. The system runs at 20 MHz and 32 KHz Oscillators (Twin Clock) and is battery driven.

DMT33AMP1/2/3

The board provides the environment for developing applications with voice or sound functions and for voice and sound middleware (VOX33, SOUND33 etc.). It contains speaker amplifier, filter and microphone amplifiers.



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