

TINY TIGER™

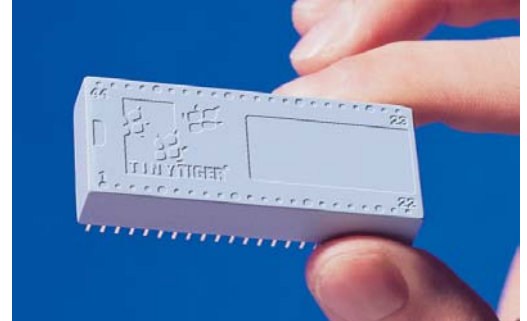


High Speed Multitasking Computer modules

Description

Tiny, high speed multitasking computers in the size of a component. TINY Tigers™ are universal, full featured control computers used in numerous projects and series products as:

- GPS systems + traffic control
- Medical Instruments
- Security applications + access control
- Vending machines
- Communications equipment
- Industrial control
- Point of sales applications
- Power plants ... and many more



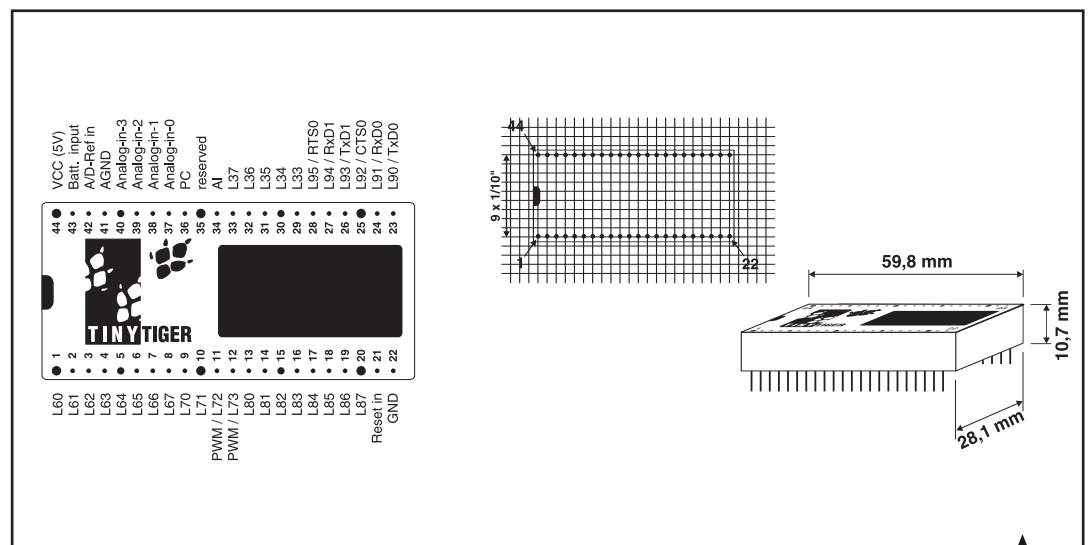
TINY Tiger™ computers offer what developers and product managers have on their wish lists:

- shortest development cycles
- highest product reliability
- low power technology
- small size
- low cost
- field updatable
- more features, more attractive products

Hardware Features

- 512 KB ... 2 MB FLASH: for program and data
- 32 KB ... 512 KB SRAM (with battery backup input)
- Real Time Clock with alarm output
- 32 BASIC tasks + 64 System tasks running simultaneously
- Speed: up to 100.000 BASIC instructions / sec
- 36 universal I/Os: analog, digital, serial, PWM, ..
- I/O expansion through I/O modules for up to 4096 channels
- In-circuit-programming, watchdog
- Low power: 50mA @full speed

Pin Layout Dimensions



Technical Data

- Dimensions: 28,1 x 59,8 x 10,7 mm (1.11 x 2.35 x 0.42")
- Weight: 28 g
- Pinning: 44-pin, 0.1" Pin-to-Pin clearance
- Operating temperature: Standard: 0°C ... +70°C (32°F to 158°F)
Expanded temperature ranges on request
- Power Supply: 4.7V ... 5.5V / 45 mA (90 mA_{typ} with RS-232 channels)
- Battery backup input: 2.7V ... 3.6V, 50 ... 100 µA (with RTC)
2.7V ... 3.6V, 2 ... 10 µA (no RTC)
- I/O pins: 36 universal I/O-lines
1 RTC alarm pin (output, low active) if RTC in module
- I/O pin driving capacity: $V_{LOW} = 0.45V$, $I_{LOW} = 1.6 mA$
Darlington driving: max 8 lines 1 ... 3.5 mA @V=1.5 V, R=1.1K
- Internal Memory: 32 KB, 128 KB or 512 KB low power SRAM with backup input
512 KB or 2 MB FLASH memory, 100,000 erase cycles min.
- External Memory: FLASH, EEPROM, RAM, ... through expansion bus and/or device drivers (I²C-Bus, SPI-Bus, SmartMedia FLASH cards, ... etc)
- Reset: Power-on reset generator in module, RESET input (low active)
- Real-time clock: With calendar and alarm output (low active), backup input
- 2 serial channels: software selectable serial channels (can be used as digital I/O too)
TTL levels, RS-485 bus operation with driver chip.
Ch-0: RxD, TxD, RTS, CTS
Ch-1: RxD, TxD
both: 300 ... 153 600 Bd, 614.4 kBd, 7/8 Data, O/E/N, XON-XOFF
- Pulses Pulse generator, pulse measurement in 3 ranges: 0.4 / 1.6 / 6.4 µs resolution.
Timer-A based Pulses / Frequency measurements: 50 µs resolution
- A/D inputs 4 channels 8, 10, 12 bits 12 bits through oversampling
A/D converter rate up to 50,000 samples / s total
A/D reference voltage (V_{ref}) 3.5 ... 5 V, 1.5 mA max.
A/D input voltage 0V ... V_{ref} , $R_i > 20 K$
A/D buffer size unbuffered or into String / Fifo of any size
A/D modes single / repeat
A/D total error +/- 4.0 LSB
- D/A outputs 2 PWM channels
PWM resolution 6, 7, 8 Bits
PWM frequency 1.2 ... 80 kHz
- Other I/O Software driven I/O-channels through I/O functions and device drivers

Programming Information

BASIC Tigers™ and TINY Tigers™ are growing families of high-performance multitasking controllers that combine impressive power and time-saving developments with very attractive prices.

BASIC Tigers™ are programmed in the Tiger BASIC™ language, that offers a powerful set of instructions and functions familiar from BASIC, C, PASCAL and other high-level languages.

Additionally, Tiger BASIC™ makes hundreds of special functions and device drivers available for common programming tasks saving days and weeks of development time. Ready-to-use functions and device drivers furthermore dramatically reduce program length and the number of possible errors to be removed in the debugging process.

Tiger BASIC™ Multitasking is easy to use as it is efficient in structuring projects into fast executing, modular objects.

Tiger BASIC™ general features:

- Unlimited number of variables and subroutines
- subroutine nesting with or without parameters, only limited by stack size
- reentrant
- local and global variables
- fast 32-bit integer math
- 64-bit double precision floating point math (15 relevant digits)
- Variable Types: Byte, Word, Long, Real, Strings, FIFO buffers
- Arrays up to 8 dimensions of strings, byte, word, long, real
- Device Drivers for effective interfacing

Tiger BASIC™ Instructions & Functions:

- **Program control**
SUB...END, CALL, RETURN,
LOOP...ENDLOOP, FOR...NEXT,
WHILE...ENDWHILE,
IF...THEN...ELSE...ENDIF, GOTO,
SWITCH...CASE...ENDSWITCH,
SWITCHI...CASE...ENDSWITCH
- **Tasks**
TASK...END, RUN_TASK, STOP_TASK,
CONT_TASK, RESTART_PROG,
SET_TASK_PRIO, RELEASE_TASK,
EXIT_TASK, DISABLE_TSW,

ENABLE_TSW, ON_ERROR_RESET,
ON_ERRTASK_CALL,
ON_ERRTASK_GOTO

■ Serial I/O functions

SHIFT_IN, SHIFT_OUT, I2C_ACK_POLL,
I2C_READ\$, I2C_RESULT, I2C_SETUP,
I2C_WRITE, SPI_SETUP, SPI_IO,
S7600_SETUP, S7600_READ,
S7600_READ\$, S7600_WRITE,
S7600_WRITE\$

■ Device Driver I/O

INSTALL_DEVICE, GET, PUT, INPUT,
INPUT_LINE, PRINT, PRINT_USING

■ Pin & Port I/Os und Ports

DIR_PIN, DIR_PORT, IN, OUT,
LL_IPOINT_AND, LL_IPOINT_IN,
LL_IPOINT_OR, LL_IPOINT_OUT,
LL_IPOINT_PULSE, LL_IPOINT_XOR, XSE-
TUP, XIN, XIN\$, XOUT, XBUS_INR\$,
XBUS_OUTR

■ FIFO buffers

FIFO, CLEAR_FIFO, LEN_FIFO,
FREE_FIFO, GET_FIFO, READ_FIFO,
UNGET_FIFO, PUT_FIFO, PUTU_FIFO,
START_FIFO, INTEGRAL_FIFO

■ Strings used as buffer

NTOS\$, NFROMS, RTOS\$, RFROMS,
STOS\$

■ FLASH

PEEK_FLASH, POKE_FLASH,
POKEM_FLASH, CHECK_FLASH,
ERASE_FLASH, SET_SERIAL_NO,
SERIAL_NO\$, DELETE_PROG,
SET_DATA_ADDR, DATA

■ Bit manipulation functions

BIT, BIT_MIRR, BITNOT, CUT_BITS,
INV_BIT, RES_BIT, SET_BIT, MASK,
IMASK, SIGNEXT, PARITY

■ Mathematical functions

ABS, CALC_CRC, EXP, EXPE, FIX, INT,
LD, LIMIT, LN, LOG, MOD, MODULO_INC,
MODULO_UPDO, LIN_APPROX, PRIME,
RND, RANDOMIZE, SGN, SQRT

■ Trigonometric functions

ACOS, ACOT, ASIN, QUICK_WORD_COS,
QUICK_WORD_SIN, ATAN, COS, COSH,
COT, COTH, SIN, SINH, TAN, TANH

- **String operation, general purpose**
 LET\$, LEN, SET_LEN\$, MAX_LEN, FILL\$, LEFT\$, MID\$, RIGHT\$, REMOVE\$, REM-DOUBLE\$, ADD\$, AND\$, OR\$, XOR\$, SHIFTL\$, SHIFTM\$, UPPER\$, UPPER7\$, CONVERT\$, CONVERT7\$
 see also:
 String as buffer, searching, mirroring, encryption, compression, signal processing
- **Formatting**
 FRAME, TABS, TRIM\$, USING, PRINT_USING, SPC, TAB, STRI\$, format strings
- **Pixel- & Vector-Graphic**
 OR\$, AND\$, XOR\$, GRAPHIC_MASK_COPY, GRAPHIC_MIRROR, GRAPHIC_COPY, INVERT, GRAPHIC_FILL_MASK, GRAPHIC_EXP\$, FILL_AREA, DRAW_LINE, DRAW_NEXT_LINE, CLOSE_LINE, SET_BASE, SET_SCALE, SET_ROTATION, SET_GRAREA, SET_DOT, DISTANCE
- **Conversions**
 VAL_NUM, VAL_REAL, STR\$, STRI\$, CHR\$, ASC, LTR, LLTOR, HREAL, LREAL, RTL, SIGNEXT
- **Mirroring**
 BIT_MIRR, BYTE_MIRR, BIT_MIRR\$, MIRROR\$, GRAPHIC_MIRROR
- **Data input and transmission**
 DEBOUNCE, DECODE, SCAN_TO_CHAR_SETUP, SCAN_TO_CHAR, SCAN_TO_TOGGLE
 see also: Compression, encryption
- **Search**
 INSTR, INDEX, INDEX_1D, INDEX_2D, SELECT\$
- **System**
 SYSVARN, SYSVAR\$, SET_SYSVARN, RESTART_PROG, DELETE_PROG, THIS_VERS, DEVEN
- **Compression**
 PACK_BYTE\$, UNPACK_BYTE\$, ASC_BCD\$, BCD_ASC\$, ASC_PBCD\$, PBCD_ASC\$, PBCD_BCD\$, BYTE_ANIB\$, ANIB_BYTE\$, BYTE_INIB\$, INIB_BYTE\$
- **Time**
 WAIT_DURATION, WAIT_NEXT, WAIT_CLOCK, TICKS, DIFF_TICKS, SET_TICKS
- **Encryption**
 BIT_MIX\$, BIT_DEMIX\$, BYTE_DEMIX\$, BYTE_DEMIX\$, SCRAMBLE\$, BYTE_MIX\$, CODE_1TON\$, DISTRIBUTE\$
- **TAN -Trans-Action-Numbers**
 TAN_CHK, TAN_COUNT, TAN_DEL, TAN_FIRST
- **Signal processing**
 SIGNAL_ADD, SIGNAL_AVERAGE, SIGNAL_BIGGER, SIGNAL_CUT_AMP, SIGNAL_CUT_MAX, SIGNAL_CUT_MIN, SIGNAL_GAP_END, SIGNAL_GAPI_END, SIGNAL_MAX, SIGNAL_MAX_AMPL, SIGNAL_MIN, SIGNAL_MUL, SIGNAL_NEXT_GAP, SIGNAL_NEXT_GAPI, SIGNAL_OFFSET, SIGNAL_SCALE, SIGNAL_SMALLER, SIGNAL_SMOOTH
- **Operators**
 +, -, *, /, BITAND, BITOR, BITXOR, SHL, SHR, SHRA, ROL, ROR
- **Boolean operators**
 AND, OR, XOR, NOT, >, >=, <, <=, <>, =
- **Preprocessor**
 #DEFINE, #INCLUDE, #PROJECT_MODEL, #COMMENT, #ENDCOMMENT
- **Compiler directives**
 USER_VAR_STRICT, USER_STACK_SIZE, USER_STRING_SIZE, USER_SECURITY, USER_EPORT, SET_DATA_ADDR, DATA
- **Declarations**
 BYTE, WORD, LONG, REAL, STRING, ARRAY, FIFO, DATALABEL