

FastForth 3.7 out of the box

We have programmed MSP-EXP430FR2355 launchpad with MSP_EXP430FR2355_24MHz_UART.txt, then downloaded FF_SPECS.f from scite editor :

B:\MSP430-FORTH\FF_SPECS.f - Sc1 [3 of 6]

File Edit Search View Tools Options Language Buffers Help

COM3:115200bps - Tera Term VT

1 forthMSP430FR.asm 2 Things

```
1 \-- coding: FF_SPECS.f
2 ;-----+
3 ; COUNTED-STRING = 255
4 ; HOLD = 34
5 ; PAD = 84
6 ; displays all ADDRESS-UNIT-BITS = 16
7 ; FLOORED = true
8 ; TARGET SELECT-CHAR = 255
9 ; MSP_EXP430FRMAX-N = 32767
10 ; MSP_EXP430FRMAX-U = 65535
11 ; LP_MSP430FR2MAX-D = 2147483647
12 ; MAX-UD = 4294967295
13 ; from scite editor STACK-CELLS = 48
14 ; RETURN-STACK-CELLS= 48
15 ; OR WORDS are CaSe-InSeNsITive
16 ; drag and drop KERNEL SPECS
17 ; then select 32.768KHZ XTAL
18 ; (RTS) UART TERMINAL
19 ; (XON/XOFF) UART TERMINAL
20 ; COLD FIXPOINT INPUT
21 ; PWR_STATE DOUBLE INPUT
22 ; ASSEMBLER
23 ; [UNDEFINED] AN CONDITIONNAL COMPIRATION
24 ; \ https://forth-stan
25 ; \ C AND x1 OPTIONS
26 ; CODE AND
27 ; AND @PSP+,TOS FORTH WORD SET
28 ; MOV @IP+,PC COLD WARM WIPE RST_HERE PWR_HERE RST_STATE PWR_STATE MARKER
29 ; ENCODE [UNDEFINED] [DEFINED] [IF] [ELSE] [THEN] HIZLO ASM [
30 ; [THEN] CREATE : IMMEDIATE POSTPONE ]
31 ; [UNDEFINED] DU, >NUMBER ABORT" QUIT TREAT COUNT \
32 ; \ https://forth-sign HOLD #> # S" U,
33 ; \ DUP X -NOECHO ECHO EMIT KEY ACCEPT CR TYPE
34 ; CODE DUP
35 ; BWI SUB #2 PSP#0 FastForth 63.M.Thorens 27498 bytes free
36 ; MOV TOS,0C
37 ; MOV @IP+,P
38 ; ENCODE
39 ; \ https://forth
40 ; 2132:05
```

19963 chars in 656 lines. Sel: 1 lines, 16 chars.

teraterm.exe

B:MSP430-FORTH\FF_SPECS.4TH download and execute: 1094 msec

OK

We try to speed up downloading, we download CHNGBAUD.f :

B:\MSP430-FORTH\CHNGBAUD.f - Sc1 [7 of 7]

File Edit Search View Tools Options Language Buffers Help

COM3:115200bps - Tera Term VT

1 forthMSP430FR.asm 2 ThingsInFirst

```
1 \-- coding: utf-8
2 ;-----+
3 ; CHNGBAUD.f Target MCLK = 24 MHz
4 ; choose your baudrate:
5 ; 0 --> 6 MBds
6 ; 1 --> 5 MBds
7 ; 2 --> 4 MBds
8 ; 3 --> 2457600 Bds
9 ; 4 --> 921600 Bds
10 ; 5 --> 460800 Bds
11 ; 6 --> 230400 Bds
12 ; 7 --> 115200 Bds
13 ; 8 --> 38400 Bds
14 ; 9 --> 19200 Bds
15 ; A --> 9600 Bds
16 ; other --> abort
17 ; drag and drop this your choice: []
18 ; COLD
19 ; [UNDEFINED] @ [IF]
20 ; \ https://forth-stan
21 ; @ c-addr -- ch
22 ; CODE @
23 ; MOV @TOS,TOS
24 ; MOV @IP+,PC
25 ; ENCODE
26 ; [THEN]
27 ; [UNDEFINED] AND [IF]
28 ; \ https://Forth-stan
29 ; \ C AND x1 x2 --
30 ; CODE AND
31 ; AND @PSP+,TOS
32 ; MOV @IP+,PC
33 ; ENCODE
34 ; [THEN]
35 ; [UNDEFINED] 0= [IF]
36 ; \ https://forth-stan
37 ; \ 0= n/u -- flag
38 ; CODE 0=
39 ; SUB #1,IOS \ bo
40 ; 2140:45
```

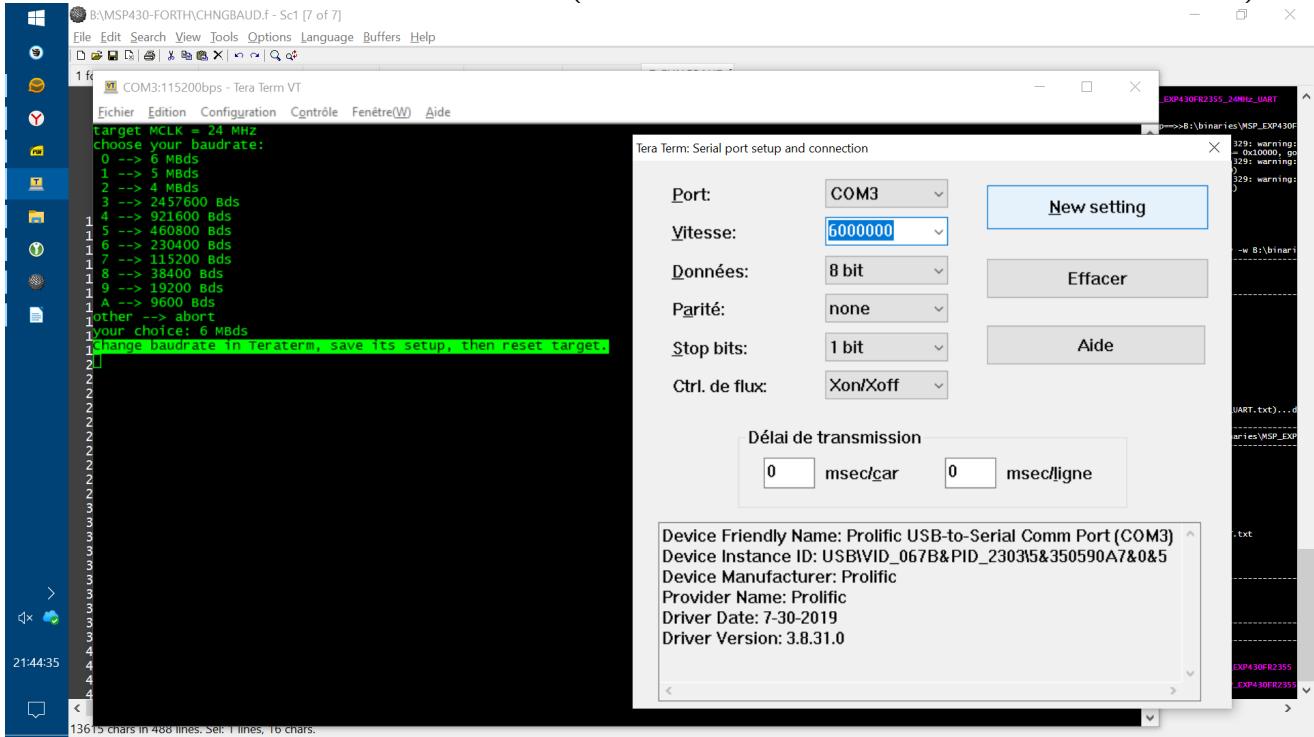
13615 chars in 488 lines. Sel: 1 lines, 16 chars.

teraterm.exe

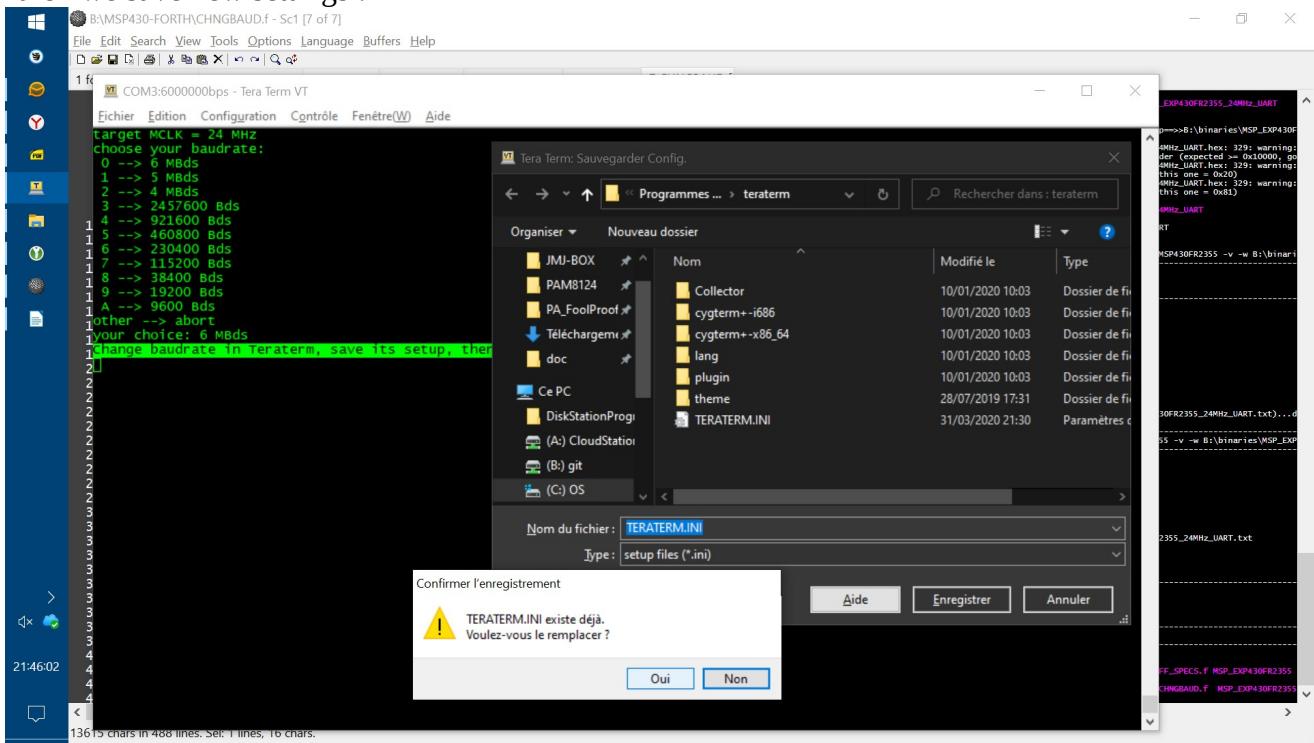
B:MSP430-FORTH\CHNGBAUD.4TH download and execute: 844 msec

OK

I choose the baudrate max for MCLK=24MHz (because I have a PL2303HXD cable shortened at 20 cm) :



then we save new settings :



and we reset the launchpad before the next.

FAST FORTH @ 24MHz downloading CORETEST.4TH, (after CORE_ANS.f has been downloaded)

```

1 forthMSP430Rasm 2 DOUBLE.f 3 MSF
File Edit Search View Tools Options Language Buffers Help
Eichier Edition Configuration Contrôle Fenêtre(W) Aide
1 forthMSP430Rasm 2 DOUBLE.f 3 MSF
1 PWR_STATE [ ] ACCEPT DUP @ $4030 = \JMT: If CFA content = $4030 (MOV @PC+,PC), ACCEPT is deferred
2 : COMPNOTFOUND IF \BODY \JMT: Find default part of deferred ACCEPT
3 THEN EXECUTE
4 $OD EMIT \ return to CR . " RECEIVED: " [CHAR] " EMIT
5 1 ABORT" [CORE_ANS] wd ABUF SWAP TYPE [CHAR] " EMIT CR
6 ;
7 ;
8 [DEFINED] [CORE_ANS] T[ ACCEPT-TEST -> ]T
9 PLEASE TYPE UP TO 80 CHARACTERS: \ ZYXWVUTSRQPONMLKJIHGFEBCAzyxwvutsrqpomlkjihgfedcba
10 : CORETESTSUCCESS RECEIVED: \ ZYXWVUTSRQPONMLKJIHGFEBCAzyxwvutsrqpomlkjihgfedcba
11 $OA BASE !
12 $OD EMIT \ return to
13 1 ABORT" CORE tests SUITING DICTIONARY SEARCH RULES
14 ;
15 ;
16 T[ : GDX
17 \ From: John Hayes S11 teraterm.exe
18 \ Subject: tester.fr T[ GDX ->
19 \ Date: Mon, 27 Nov 95
20 \ (C) 1995 JOHNS HOPKINTESTING TO
21 \ MAY BE DISTRIBUTED F
22 \ VERSION 1.1 T[ 111 VA
23 \ -999 VA
24 \ 22/1/09 The words { T[ V1 -> 111 }T
25 \ agree with the Forth! { T[ V2 -> -999 }T
26 \ locals using { ... T[ 222 TO V1 -> }T
27 \ T[ V1 -> 222 }T
28 \ T[ V1 : vd1 V1 ; -> }T
29 \ T[ vd1 V1 -> 222 }T
30 \ 13/05/14 jmt. added T[ vd1 -> 222 }T
31 ;
32 O CONSTANT FALSE T[ : vd2 TO V2 ; -> }T
33 -1 CONSTANT TRUE T[ V2 -> -999 }T
34 ;
35 \ SET THE FOLLOWING FILT[ V2 -> -333 }T
36 \ ALLOW YOU TO TELL WHT[ V1 -> 222 }T
37 VARIABLE VERBOSE
38 FALSE VERBOSE !
39 \ TRUE VERBOSE ! CR . ( End of core word set tests)
40 End of core word set tests
41 \ : EMPTY-STACK ( ...
42 \ DEPTH ?DUP CORE tests success!
43 \ ;

21:41:51 li=1 co=1 INS (CR+LF)

```

Notice the simplest of IDE's : scite editor, FastForth with its terminal. And the baudrate of COM3...

As another launchpad with I2C_FastForth is wired via an I2C BUS onto this launchpad, we can connect it :

FAST FORTH after downloading of the driver UARTI2CS.f

```

1 forthMSP430Rasm 2 UARTI2CS.f 3 DOUBLE.f 4 MSP
File Edit Search View Tools Options Language Buffers Help
Eichier Edition Configuration Contrôle Fenêtre(W) Aide
1 forthMSP430Rasm 2 UARTI2CS.f 3 DOUBLE.f 4 MSP
648 \ init I2C_MASTER I/O
649 \ IF
650 MOV #QUIT_I2C,R0
651 THEN
652 BIC.B #SM_BUS,&I2CSM_REN
653 BIC.B #SM_BUS,&I2CSM_OUT
654 \
655 \ activate I/O
656 BIC #1,&PMSCTL0
657 MOV.B #4,X
658 GOTO BW3
659 ENDASM
660 \
661 \ =====
662 \ Driver UART to I2CM: this Fast
663 \ =====
664 \ type on TERMINAL "$10 UARTI2CS: UARTI2CS
665 \ CR
666 : UARTI2CS \ Slave
667 CR \ to com
668 HIZL0 \ R14+,R13
669 MOV @RSPI+,IP \ R14,&I2CS_ADR
670 MOV TOS,&I2CS_ADR \ save
671 MOV @SPH+,TOS \ save
672 MOV #WARM,X \ WARM
673 MOV #I2C_WARM,2(X) \ replace
674 MOV X,PC \ execute
675 ENDCODE
676 \
677 RST_HERE \ RST_HERE
678 \ [ELSE] I2CTERM_ABORT
679 [THEN] I2CTERM_ABORT \ display
680 \ [THEN] ECHO \ [THEN] ECHO
681 \ #16 UARTI2CS ; Alt-B (TERATERM) or S2+RESET (I2C_Master) to quit
682 \ Since there is no difference in behaviour whether the TERMINAL is connected to the Master
683 \ or bridged to any Slave, WARM is the convenient way to check which target is connected to,
684 \ because, as any ABORT message, WARM displays first the decimal I2C address if applicable:
685 \ Since there is no difference in behaviour whether the TERMINAL is connected to the Master
686 \ or bridged to any Slave, WARM
687 \ because, as any ABORT message, WARM
688 WARM \ #0 FastForth ©J.M.Thorens 10636 bytes free
689

14:20:34 li=27 co=57 INS (CR+LF)

```

We see the work of preprocessor GEMA that replaces symbolic names by assembler's ones.

We also see the decimal address of the connected I2C_FastForth at the beginning of the message in reverse video.

I2C_Slave FAST FORTH @24MHz downloading CORETEST.4TH, (after CORE_ANS.f has been downloaded)

```

File Edit Search View Tools Options Language
Eichier Edition Configuration Contrôle Fenêtre(W) Aide
1 forthMSP430FR.asm 2 DOUBLE.f 3 MSP430FR
1 PWR_STATE
2 : COMPNOTFOUND
3 $OD EMIT \ return to column 1
4 1 ABORT" {CORE_ANS} word set"
5 ;
6 [DEFINED] {CORE_ANS} [IF]
7 : CORETESTSUCCESS
8 $OA BASE !
9 $OD EMIT \ return to column 1
10 1 ABORT" CORE tests success"
11 ;
12 [TESTING]
13 \ From: John Hayes S1X
14 \ Subject: tester.fr
15 \ Date: Mon, 27 Nov 95 13:10
16 \ (C) 1995 JOHNS HOPKINS
17 \ MAY BE DISTRIBUTED FREELY
18 \ VERSION 1.1
19 \ 22/1/09 The words { and }
20 \ agree with the Forth 200X file
21 \ locals using { ... } and th
22 \ 13/05/14 jmt. added coloris
23 \ 0 CONSTANT FALSE
24 \ -1 CONSTANT TRUE
25 \ SET THE FOLLOWING FLAG TO T
26 \ ALLOW YOU TO TELL WHICH TEST
27 \ VARIABLE VERBOSE !
28 \ FALSE VERBOSE !
29 \ TRUE VERBOSE !
30 \ : EMPTY-STACK ( ... -- )
31 \ DEPTH ?DUP
32 \ TF DUP 0< IF NEGATE O
33 \ : S1G CORE Tests success!
34
35
36
37
38
39
40
41
42
43

```

21:44:10

li=1 co=1 INS (CR+LF)

No difference in behavior of FastForth with UART TERMINAL or with I2C TERMINAL, apart from the download time...

same, with an error due to a word not found

```

File Edit Search View Tools Options Language
Eichier Edition Configuration Contrôle Fenêtre(W) Aide
1 forthMSP430FR.asm 2 DOUBLE.f 3 MSP430FR
1 PWR_STATE
2 : COMPNOTFOUND
3 $OD EMIT \ return to column 1
4 1 ABORT" {CORE_ANS} word set not found!"
5 ;
6 [DEFINED] {CORE_ANS} [IF]
7 : CORETESTSUCCESS
8 $OA BASE !
9 $OD EMIT \ return to column 1
10 1 ABORT" CORE tests success!"
11 ;
12 [TESTING]
13 \ From: John Hayes S1X
14 \ Subject: tester.fr
15 \ Date: Mon, 27 Nov 95 13:10
16 \ (C) 1995 JOHNS HOPKINS UNI
17 \ MAY BE DISTRIBUTED FREELY
18 \ VERSION 1.1
19 \ 22/1/09 The words { and }
20 \ agree with the Forth 200X file
21 \ locals using { ... } and th
22 \ 13/05/14 jmt. added colorised error messages.
23 \ 0 CONSTANT FALSE
24 \ -1 CONSTANT TRUE
25 \ SET THE FOLLOWING FLAG TO T
26 \ ALLOW YOU TO TELL WHICH TEST
27 \ VARIABLE VERBOSE !
28 \ FALSE VERBOSE !
29 \ TRUE VERBOSE !
30 \ : EMPTY-STACK ( ... -- )
31 \ DEPTH ?DUP
32 \ TF DUP 0< IF NEGATE O
33 \ : S1G CORE Tests success!
34
35
36
37
38
39
40
41
42
43

```

21:59:55

li=2 co=17 INS (CR+LF)

Once the error is fixed in the source file, FastForth is ready to reload it **without any other action**, due to the smart error process that automatically shortens the main program to its state defined by **PWR_STATE**.

After downloading FF_SPECS.f, we see the FastForth specifications in its minimum configuration, ready to download any program file from the \MSP430-FORTH folder, and hopefully yours too !

```
Z:\MSP430-FORTH\FF_SPECS.f -> COM3:600000bps - Tera Term VT
File Edit Search View Tools Opt Fichier Edition Configuration Contrôle Fenêtre(W) Aide
1 forthMSP430FR.asm 2 UARTI2CS fastForth V3.5 for MSP430FR5738, DTC=2, 16-Entry word sets, 24 MHz, 5044 bytes
583 $20 EMIT //COUNTED-STRING = 255
584 IN2_THREAD @ U_# HOLD = 34
585 FREQ_KHZ @ 0 1000/PAD = 84
586 ?DUP IP #8 EMIT #ADDRESS-UNIT-BITS = 16
587 THEN . Mhz, " FLOORED = true
588 - U_." bytes" MAX-CHAR = 255
589 ESC [Om MAX-N = 32767
590 CR MAX-U = 65535
591 .. /COUNTED-STRING MAX-D = 2147483647
592 .. /HOLD MAX-UD = 4294967295
593 .. /PAD STACK-CELLS = 48
594 .. ADDRESS-UNIT-B RETURN-STACK-CELLS= 48
595 .. FLOORED WORDS are Case InSeNsitive
596 .. MAX-CHAR
597 .. MAX-N KERNEL SPECS
598 .. MAX-U 32.768KHZ XTAL
599 .. MAX-D I2C SLAVE TERMINAL
600 .. MAX-UD FIXPOINT INPUT
601 .. STACK-CELLS DOUBLE INPUT
602 .. RETURN-STACK-CASSEMBLER
603 .. WORDS are CASECONDITIONNAL COMPILATION
604 CR
605 ESC [7m ." KERNEL OPTIONS
606 CR
607 KERNEL_ADDON @ FORTH_WORD_Set
608 DUP 0< IF ." COLD WARM WIPE RST_HERE PWR_HERE RST_STATE PWR_STATE MARKER
609 2* DUP 0< IF 2* [UNDEFINED] [DEFINED] [IF] [ELSE] [THEN] HIZLO ASM CODE
610 ELSE 2* CREATE : IMMEDIATE POSTPONE ]
611 O< IF [.] ABORT" QUIT INTERPRET COUNT \
612 THEN , >NUMBER FIND WORD .
613 THEN SIGN HOLD #> "# S"
614 2* DUP 0< IF ." NOECHO ECHO KEY ACCEPT .
615 ELSE ." 616 THEN 616 #0 FastForth @J.M.Thoorens 10636 bytes free
617 2* DUP 0< IF ." 618 2* DUP 0< IF ." 619 2* DUP 0< IF ." 620 2* DUP 0< IF ." 621 2* DUP 0< IF ." 622 2* DUP 0< IF ." 623 2* DUP 0< IF ." DOUBLE INPUT" CR THEN 624 2* DUP 0< IF ." VOCABULARY SET" CR THEN 625 2* DUP 0< IF ." DEFERRED WORDS" CR THEN
11:58:59
```

OK

Z:\MSP430-FORTH\FF_SPECS.4TH download and execute: 406 msec

ii=603 co=14 INS (CR+LF)

s:\Config\SendSource.bat Z:\MSP430-FORTH\FF_SPECS.4TH

>\Config\SendSource.bat Z:\MSP430-FORTH\FF_SPECS.4TH

By leveraging the best of FRAM technology and thanks to its amazing innovations, FastForth is impressive in efficiency during the most expensive development phase of a program with its very many round trips between real-time testing and code fixes.

And, by modifying the I2C addresses in the UARTI2CS.f file we can work with many I2C_FastForth targets...