XC164CM series Easy Kit

Board REV. V2.0 and V2.1

Microcontrollers

Never stop thinking.

XC164CM series Easy Kit

Revision History:	**2005-04**	V 1.0
Previous Version:	-	

Page	Subjects (major changes since last revision)

We Listen to Your Comments

Any information within this document that you feel is wrong, unclear or missing at all? Your feedback will help us to continuously improve the quality of this document. Please send your proposal (including a reference to this document) to:

mcdocu.comments@infineon.com

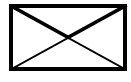


Table of Contents **Page**

1 Introduction . . . 5

2 Features of the XC164CM series Easy Kit Board . . . 6
2.1 Summary of Features . . . 6
2.2 Block Diagram . . . 7
2.3 Layout Overview . . . 8
2.4 DIP Switch S102 . . . 9
2.5 Power Supply . . . 10

3 Description of Connectors and Switches . . . 11
3.1 Switch S102 . . . 11
3.2 Headers and Connectors . . . 12
3.2.1 RS-232 Connector - ASC0 (P101) . . . 12
3.2.2 CAN1 (P102) . . . 12
3.2.3 CAN2 (X103) . . . 12
3.2.4 LIN Header (X104) . . . 13
3.2.5 OCDS Interface . . . 13
3.2.6 Power Headers (optional) . . . 14
3.3 Pin Definition and Location . . . 15
3.4 Zero Ohm Resistors . . . 17

4 Memory Models . . . 18
4.1 Internal Flash . . . 18
4.2 Internal PRAM . . . 19

5 Quick Start Up . . . 20
5.1 Power Supply . . . 20
5.2 OCDS debugging interface . . . 21
5.3 RS232 Interface . . . 21
5.4 MemTool . . . 22
5.5 ASC-Bootstrap . . . 22
5.6 Start Memtool . . . 22
5.7 Connect to the Target . . . 23
5.8 Prepare Memtool for programming . . . 23
5.9 Program . . . 24
5.10 Execution Mode . . . 24

6 Schematic . . . 25

1 Introduction

The XC164CM-8FF is a new member of Infineon's XC166 family of 16-bit microcontrollers based on the high-performance C166S V2 core in a sub-0.25µ technology. The C166S V2 core more than doubles the performance of the well established C166 core while still providing code compatibility.

Applications can be developed easily. The Evaluation Board is equipped with peripherals for connection to the environment. There is also an interface for the On Chip Debugging Features (OCDS1). For programming of the embedded Flash, Infineon provides a tool, called MEMTOOL.

The Evaluation Board allows easily the development of XC164CM family applications with the corresponding tools. Subsequently, the applications can be downloaded and can be tested with the powerful debugger software.

For detailed technical information about the XC164CM please refer to the User´s Manual of the XC164CM V1.1 and the Data Sheet V1.1.

To make sure that you always have the latest Dokumentation please contact your local FAE or visit our XC164CM internet homepage:

http://www.infineon.com/XC164CM

2 Features of the XC164CM series Easy Kit Board

The XC164CM series Easy Kit is soldert with the XC164CM-8F device. This device fit into all members of this product family so that there are no special Easy Kit Boards necessary.

2.1 Summary of Features

- Infineon's XC164CM Controller in TQFP64 Package
- On-board dual voltage power supply provides 5V/2.6V to XC164CM
- High Speed CAN Transceivers, LIN Transceiver, UART(RS232)
- 8 Low Power Status LEDs
- Easy access to all pins

Connectors

The XC164CM Board offers a wide variety of connectors:

- SUB-D9 connector for ASC0 Interface via RS 232 port
- 4 pin header for LIN Transceiver (ASC1)
- 16-pin header for JTAG interface (OCDS)
- SUB-D9 connector for CAN High Speed Transceiver (CAN1)
- 10pin (2x5) Header for CAN High Speed Transceiver (CAN2)
- Easy access to all pins

Components

- Dual Low-Drop Voltage Regulator TLE 7469 to supply 5V/2.6V
- Two LEDs to validate power supply (5Volt / 2.6Volt)
- LED indicating /RSTIN active state
- 2 x CAN-Transceiver TLE 6250
- LIN Transceiver TLE 7259
- 8 general purpose LEDs
- Reset switch

Zero Ohm Bridges

- Zero Ohm resistors give the flexibility to configure the systems functionality

2.2 Block Diagram

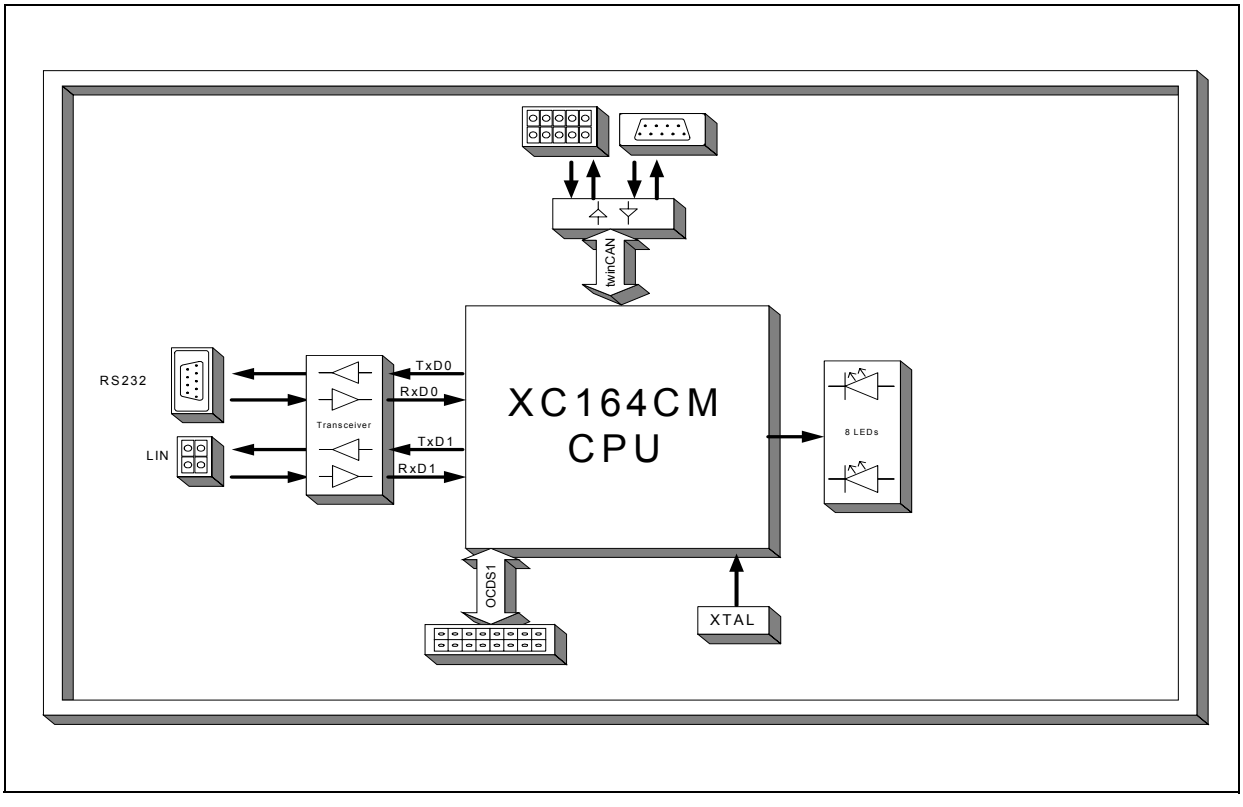


Figure 1 Block diagram of XC164CM Easy Kit

2.3 Layout Overview

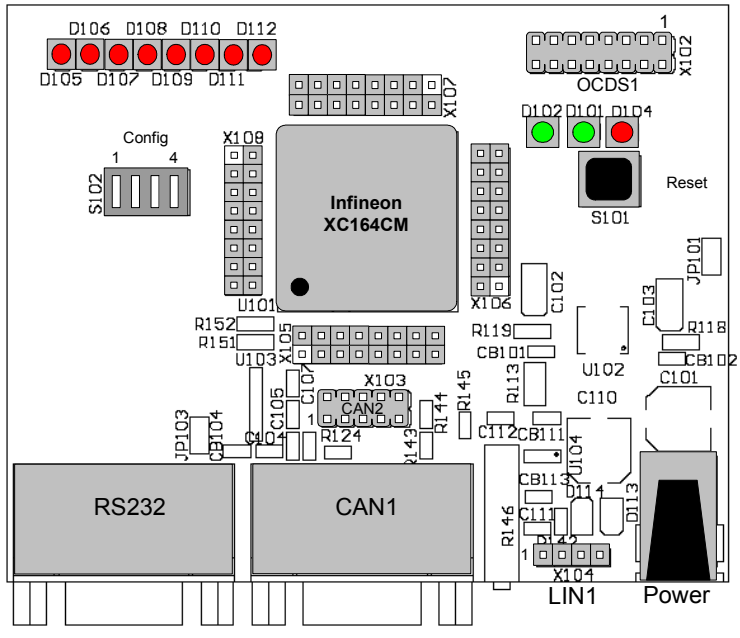


Figure 2 Top view

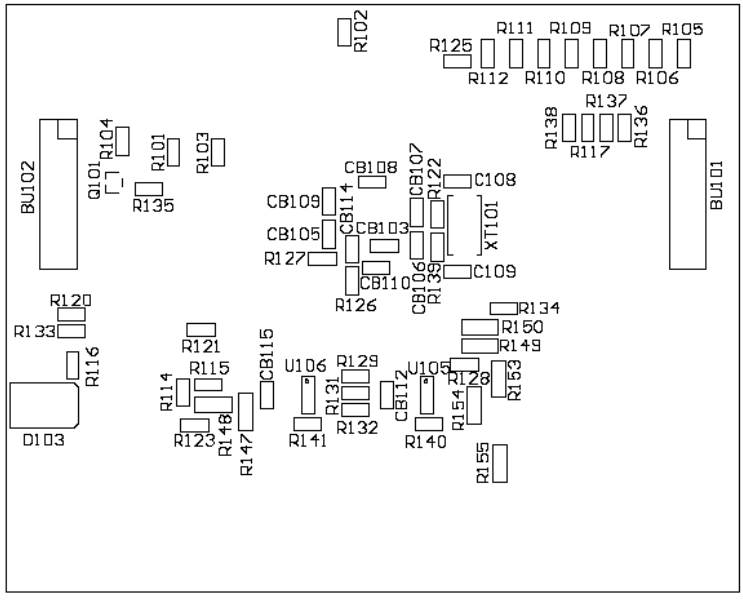


Figure 3 Bottom view

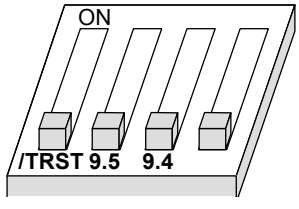
2.4 DIP Switch S102

Although most of the programmable features of the XC164CM are selected by software either during the initialization phase or repeatedly during program execution, some features must be selected earlier because they are used for the first access of the program execution.

These configurations are accomplished by latching the logic levels at a number of pins at the end of the internal reset sequence.

DIP switch S102 allows to configure the startup setting of the XC164CM during RESET. The default System Startup Configuration is shown in **Table 1**. All DIP Switch are OFF. The XC164CM execute a standard start from internal Flash.

Table 1 Default configuration

Name in schematic	Default configuration	Description
S102		Startup configuration: Standard start from internal Flash (Default)

The pull-ups on the configuration pins are activated while TRST = 1 and the hardware reset signal is active shown in the **Table 2** below.

Table 2 Basic Startup Configuration via External Circuitry

XC164CM Pin level configured by S102	Function
/TRST = 0, P9.5 = x, P9.4 = x,	Default standard start internal Flash
/TRST = 1, P9.5 = 1, P9.4 = 1,	Standard start internal Flash
/TRST = 1, P9.5 = 0, P9.4 = 1,	Bootstrap loader via ASC0
/TRST = 1, P9.5 = 1, P9.4 = 0,	Bootstrap loader via CAN
/TRST = 1, P9.5 = 0, P9.4 = 0,	Adapt Mode
All other positions	Reserved

For more detailed information aboute the DIP switch setting please refer to **Chapter 3.1**, **Table 3**.

2.5 Power Supply

The XC164CM Board needs an external power supply. A regulated DC power supply with **max. 12 Volts** / 400mA can be connected to the power connector.

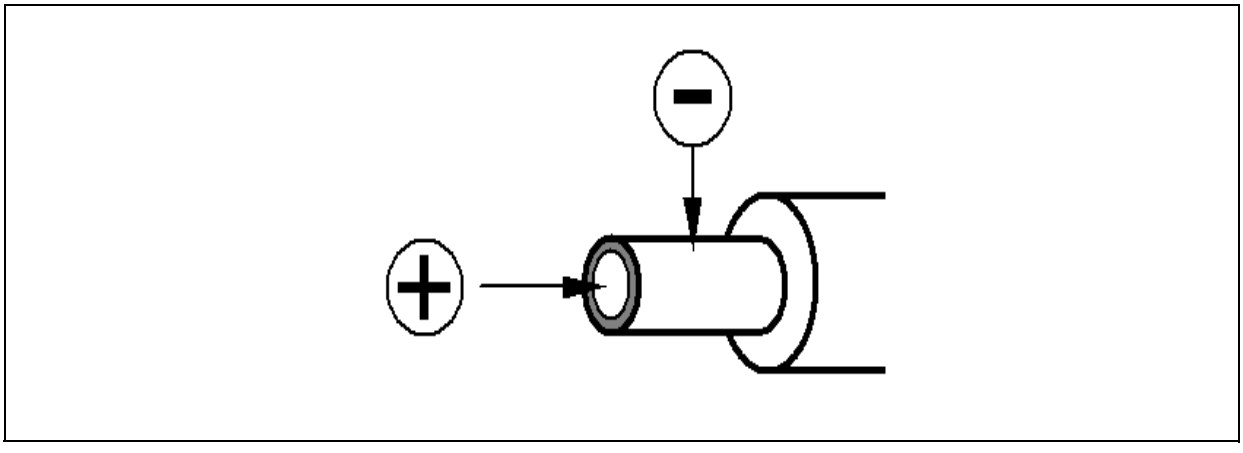


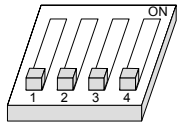
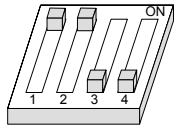
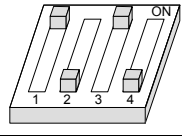
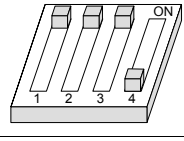
Figure 4 Power Supply

3 Description of Connectors and Switches

The On-Chip Bootstrap Loader allows the start code to be moved into the internal PSRAM of the XC164CM via the serial interface ASC0. The XC164CM will then execute the loaded start code out of the PSRAM.

3.1 Switch S102

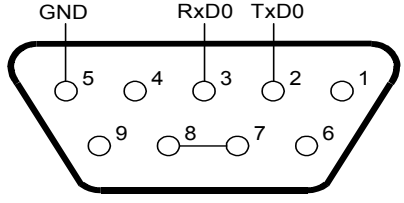
Table 3 DIP Switch Settings for S102

Name in schematic	Default configuration	Description
S102		Startup configuration: Standard start from internal Flash **OFF-OFF-OFF-OFF**
S102		Startup configuration: Bootstrap loader ASC **ON-ON-OFF-OFF**
S102		Startup configuration: Bootstrap loader CAN **ON-OFF-ON-OFF**
S102		Startup configuration Adapt Mode **ON-ON-ON-OFF**
S102		Startup configuration All other positions are reserved

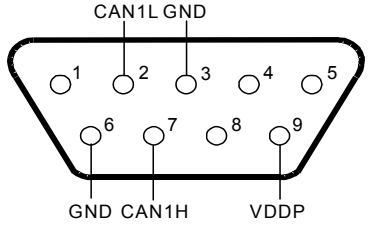
Note: For debugging purpose (OCDS) the standard start from internal Flash configuration must be used.

3.2 Headers and Connectors

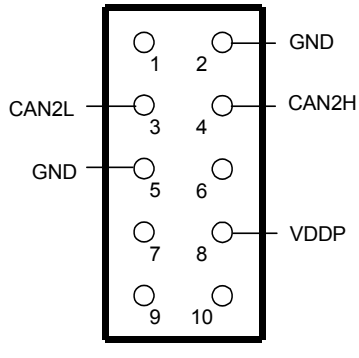
3.2.1 RS-232 Connector - ASC0 (P101)



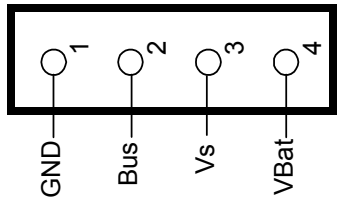
3.2.2 CAN1 (P102)



3.2.3 CAN2 (X103)

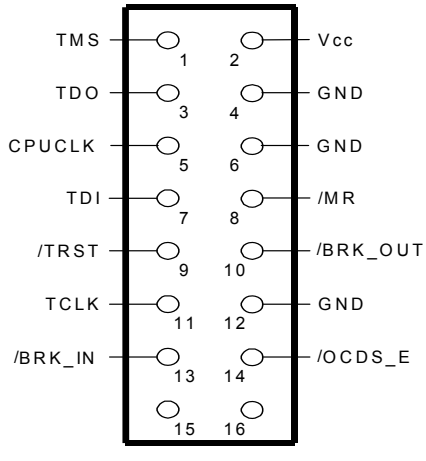


3.2.4 LIN Header (X104)



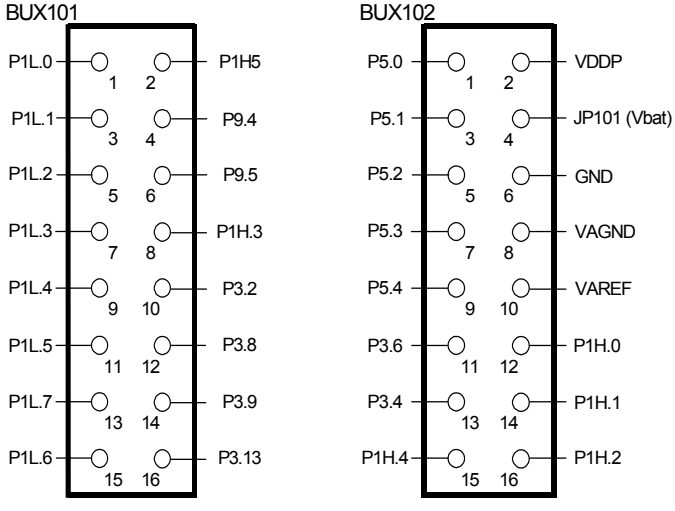
3.2.5 OCDS Interface

On-board header X501



3.2.6 Power Headers (optional)

The power headers can be mounted if a power inverter board for electrical motor drive application is used.



3.3 Pin Definition and Location

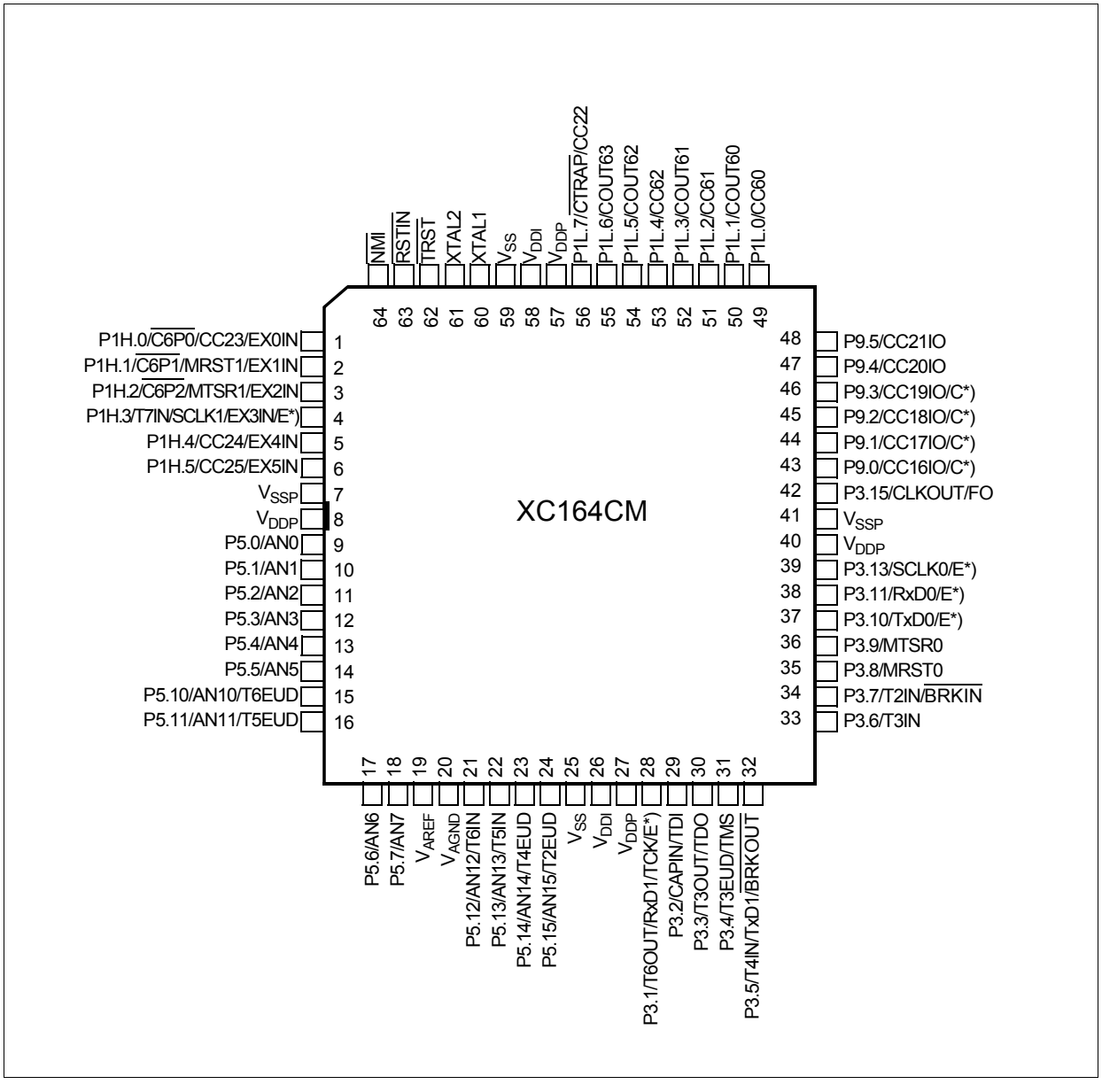


Figure 5 Pinout of the XC164CM

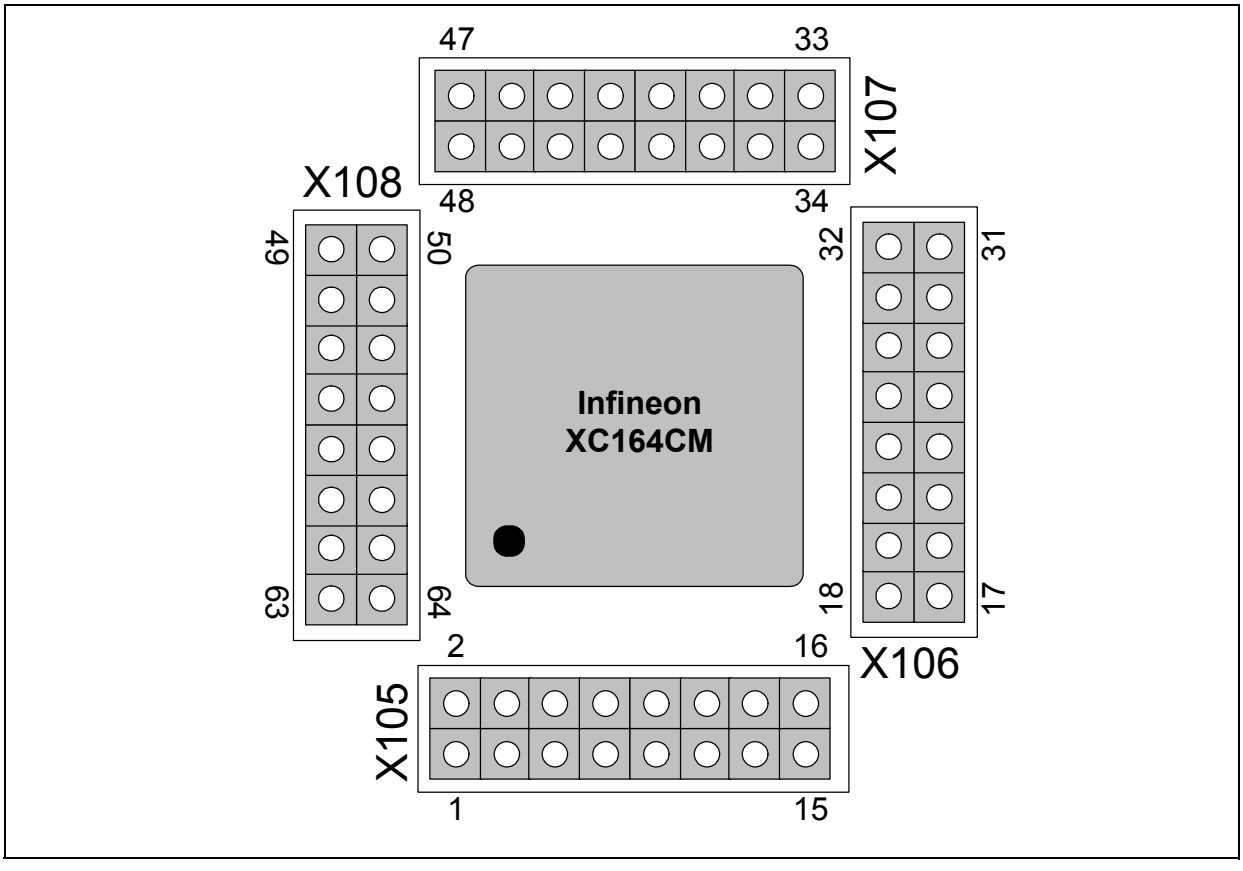


Figure 6 Pin connector of the XC164CM Easy Kit

3.4 Zero Ohm Resistors

For configuration purposes several zero ohm resistors have been implemented. The functionality of these resistors are shown in the table below.

Table 4 Zero Ohm Resistors

Component	Name in schematic	Description
TLE 6259-26 (LIN Transceiver Board Rev V2.0) TLE 7259 (LIN Transceiver Board Rev V2.1)	R123 R147 / R148	enable / disable connect / disconnect
TLE 6250G (CAN Transceiver)	R149 / R 150 R151 / R152 R128 R129 R143 R144 R124 / R130 R131 / R132	connect / disconnect (CAN1) connect / disconnect (CAN2) enable / disable (CAN1) enable / disable (CAN2) supply Bus voltage internal / external (CAN1) supply Bus voltage internal / external (CAN2) connect Bus / disconnect Bus (CAN1) connect Bus / disconnect Bus (CAN1)
TLE 7469V52 (Voltage Regulator)	R120 R121 R118 / R119 R116	disable / enable Watchdog input disable / enable Watchdog functionality connect / disconnect 5 V / 2.6V voltage disable / enable voltage regulator
HIN202IBN (RS232 Level Shifter)	R153 R154 R155	Connect / disconnect Transmit TxD0 Connect / disconnect Receive TxD0 On / off levelshifter device
Status LED´s oscillator circuit Analog reference	R125 R122 R126 / R127	connect / disconnect LED´s to 5 V oscillator gain change of analog reference source

4 Memory Models

The memory space of the XC164CM is configured in a “von Neumann” architecture. This means that code and data are accessed within the same linear address space.

Attached there are two examples for memory mapping of the XC164CM Board.

4.1 Internal Flash

The XC164CM incorporates 64 Kbytes of embedded Flash memory (starting at location C0’0000H) for code or constant data. It is operated from the 5 V pad supply and requires no additional programming voltage. The Flash array is organized in five sectors of 4 × 8 Kbytes, and 1 × 32 Kbytes1). It combines the advantages of very fast read accesses with protected but simple writing algorithms for programming and erasing. The 64-bit code read accesses realize maximum CPU performance by fetching two double word instructions (or four single word instructions) in a single access cycle.

Data integrity is enhanced by an error correction code enabling dynamic correction ofsingle bit errors. Additionally, special margin checks are provided to detect and correct problematic bits before they lead to actual malfunctions.

The On-chip programming can be done either with a utility program, so called “Memtool” or with several other Toolchains of our Tool vendors. Memtool is using the ASC bootstrap Loader. The latest version can be found on the Infineon web side. Other tools are using the OCDS interface.

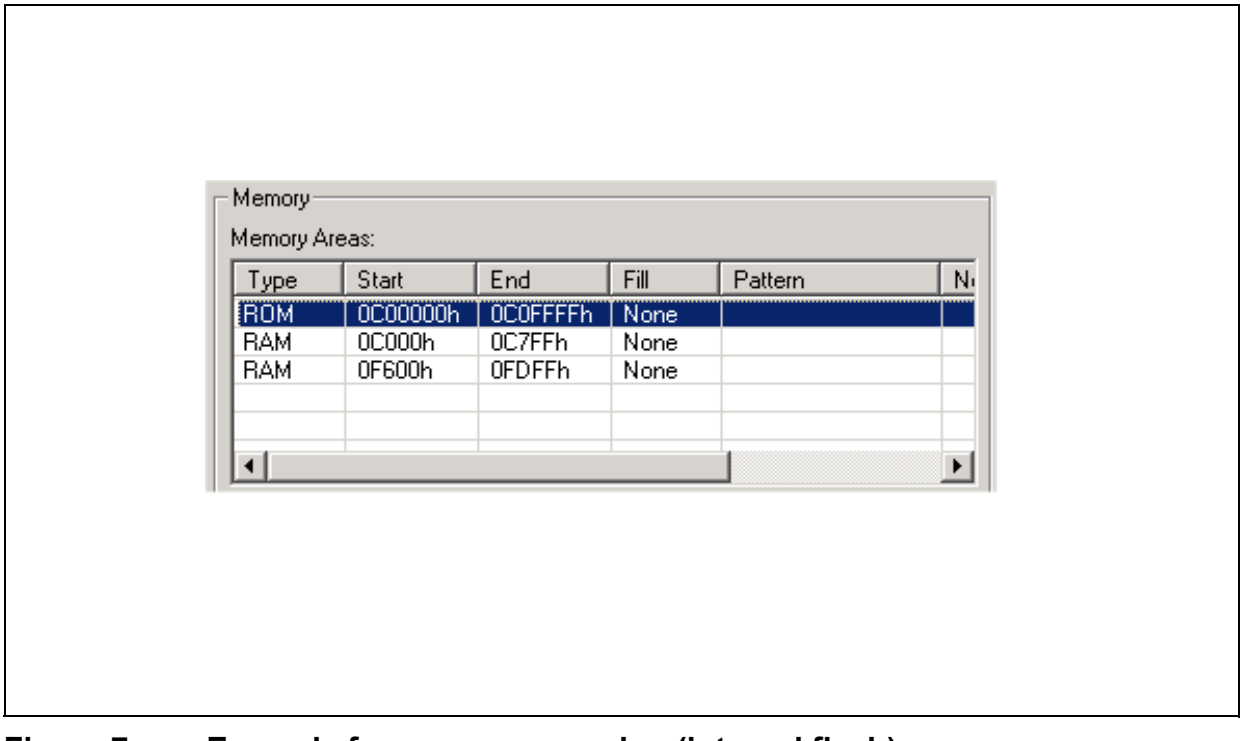


Figure 7 Example for memory mapping (internal flash)

4.2 Internal PRAM

The XC164CM provides 2 Kbytes of PSRAM (E0'0000H … E0'07FFH). The PSRAM provides fast code execution without initial delays. Therefore, it supports non-sequential code execution, for example via the interrupt vector table.

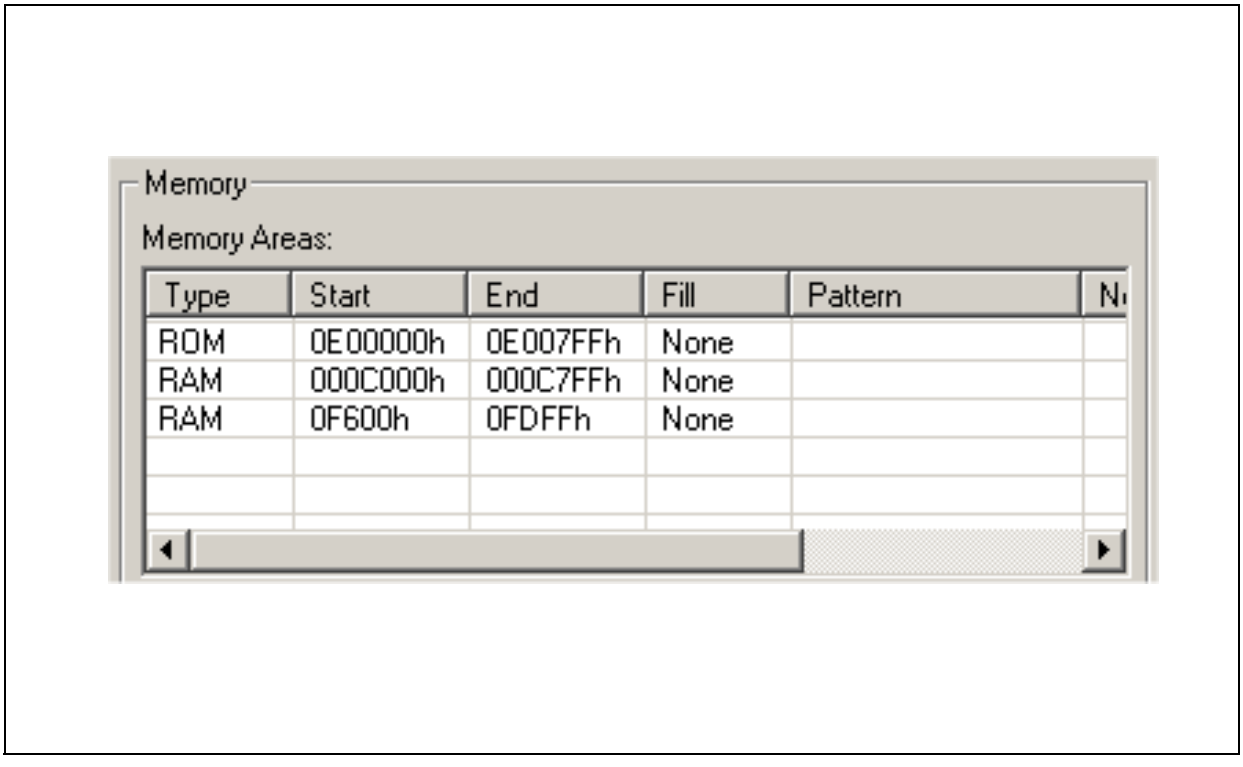
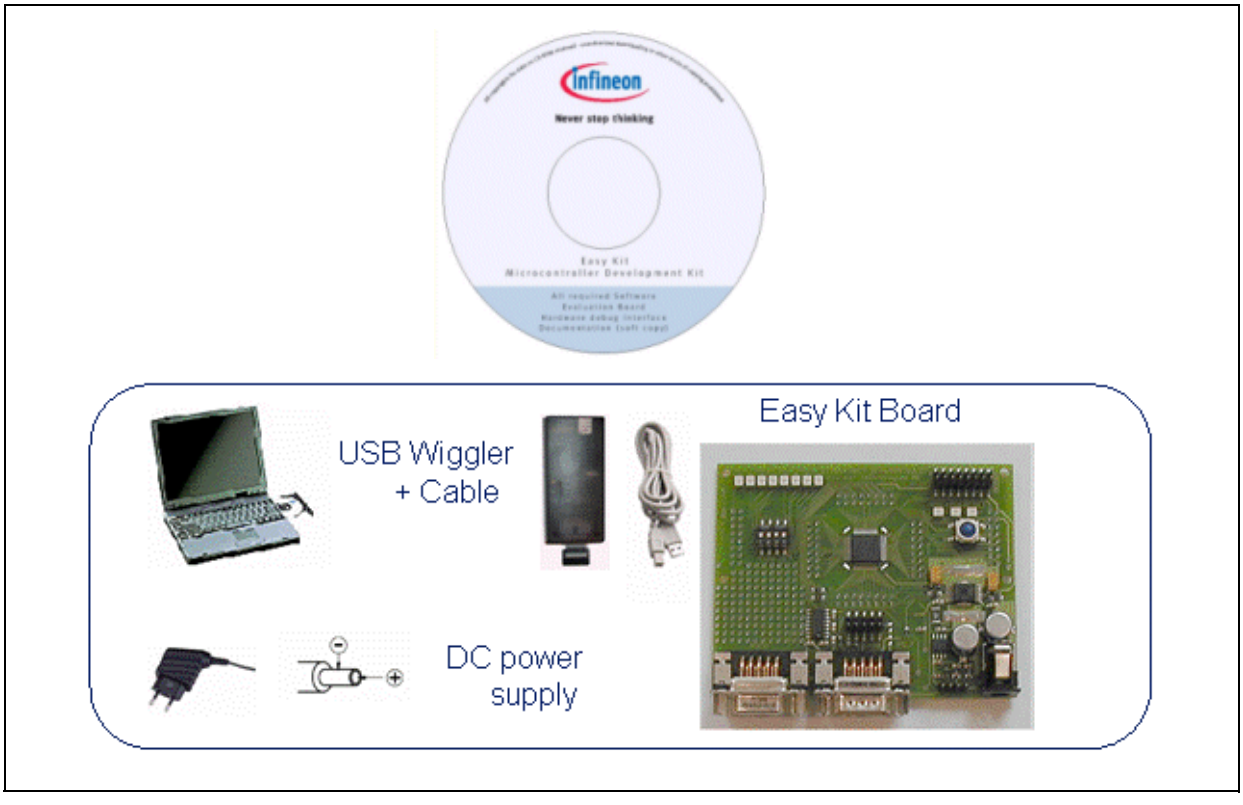


Figure 8 Memory mapping for internal PRAM

5 Quick Start Up

For a successful start up of the XC164CMEasy Kit the following items should be done:

Start the index.htm on the EasyKit CD and follow the Getting Started.



5.1 Power Supply

A regulated DC power supply with max. 12 Volts / 400mA should be connected to the power connector. Both green LED´s should be active.

Please Note, the power supply is not part of the delivery !

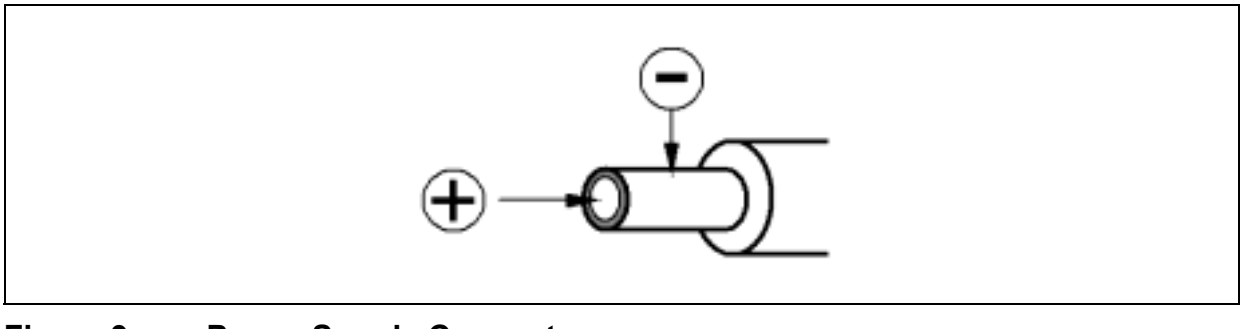


Figure 9 Power Supply Connector

5.2 OCDS debugging interface

The XC164CM includes an On-Chip Debug Support (OCDS) system, which provides convenient debugging, controlled directly by an external device via debug interface pins.

Within the XC164CM Easy Kit you get the USB Wiggler. For installing all the required Hardware and Software please follow the Getting Started on the Easy Kit CD by click on the Logo.

Figure 10 Getting Started on Easy Kit CD

5.3 RS232 Interface

For flashing the program to the microcontroller a serial interface among the PC(RS232/ COMx interface) and the XC164M board(ASC0/P101) is needed.

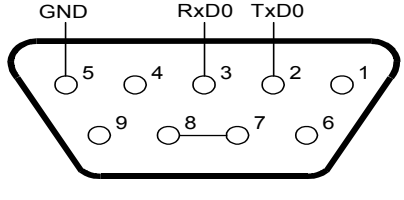


Figure 11 ASC0 Interface on the XC164CM board

5.4 MemTool

What is Memtool?

Memtool is one of Infineon's solutions for programming code and data into FLASH Memory. Memtool supports on-chip FLASH Memory as well as dedicated Flash chips on the target board.

Memtool uses the ASC bootstrap Loader and can be found on the XC164CM Starterkit CD under Tools.

5.5 ASC-Bootstrap

To establish the connection between the ASC bootstrap loader of the XC164CM microcontroller and the PC (MemTool) the bootstrap loader mode has to be configured.

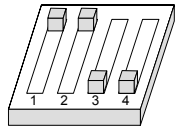


Figure 12 ASC Bootstrap loader mode (DIP Switch S102)

5.6 Start Memtool

Go to Target dialog (Target ? Change) and select 'Generic Target with '**SAB XC164CM-8FF**' from the list. Select the Baud rate and Click 'ok'

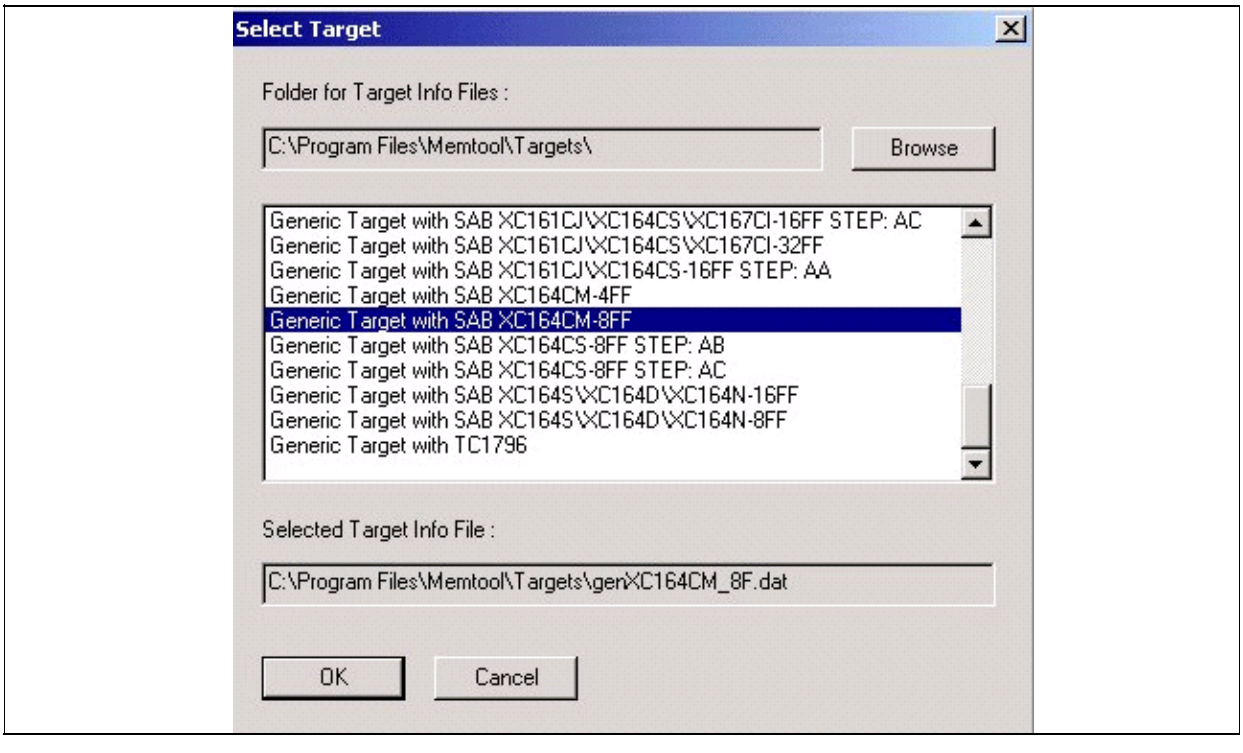


Figure 13 Configuration of the microcontroller type

5.7 Connect to the Target

Make sure that the Starter Kit board is connected to your PC as well as to your power supply. Hit the reset key on the starter kit. Now press the 'connect' button in Memtool.

If the software status bar displays 'Ready for Memtool Command' you successfully installed Memtool.

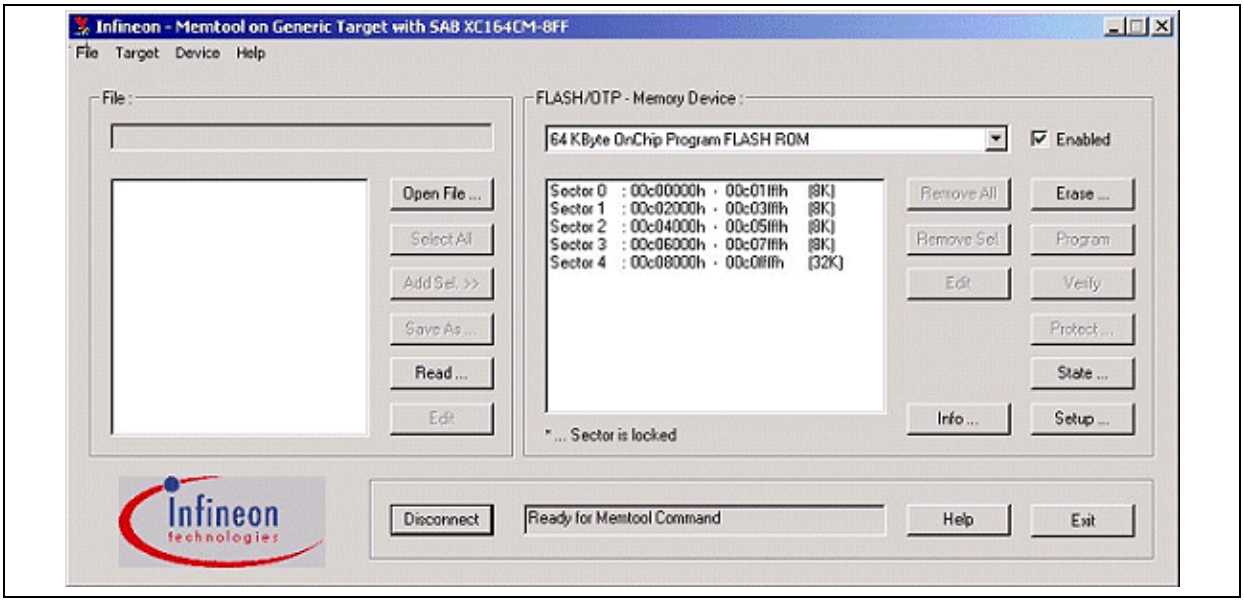


Figure 14 Successful connection

5.8 Prepare Memtool for programming

Check the setup for programming, select “Automatic Erase before Program” and Automatic Verify after Program

Open the compiled hex file (*.hex / *.h86) from the project directory and push the “Select All” and “Add Sel.>>” Buttons

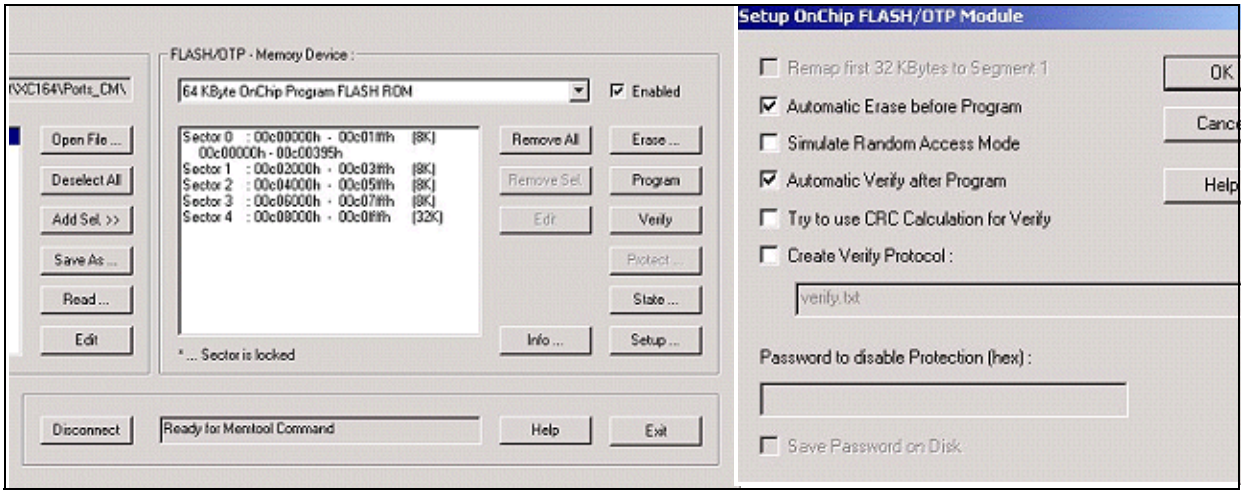


Figure 15 Setup for programming

5.9 Program

Press the “Program” Button and check the result of the programming.

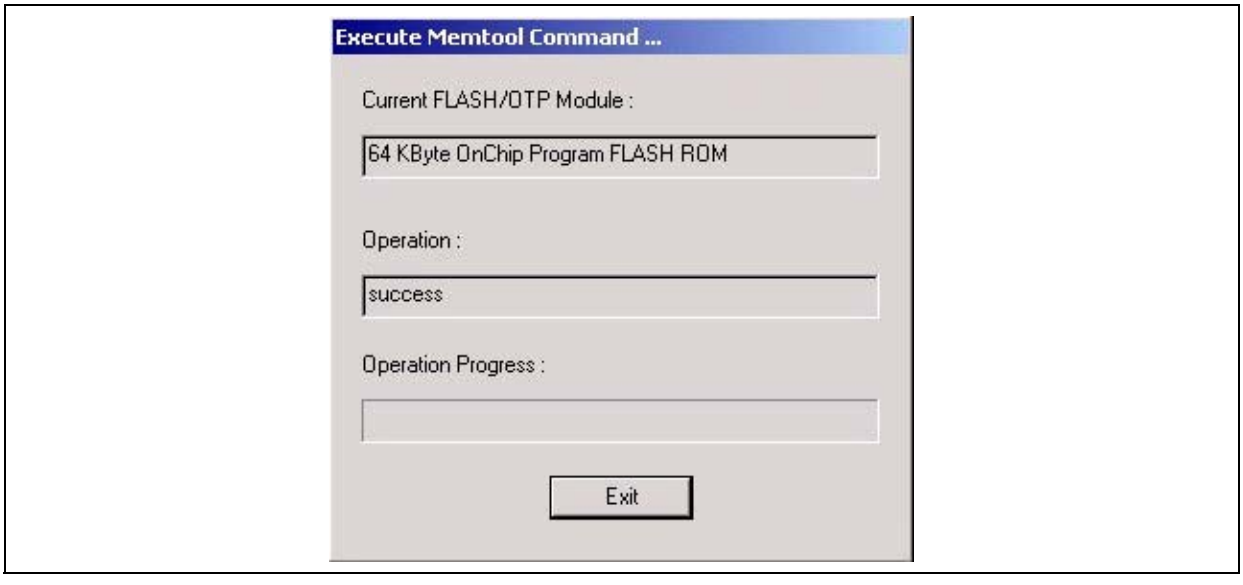


Figure 16 Program

After the successful program press “Disconnect Now”

5.10 Execution Mode

After the code is programmed in the internal flash the microcontroller has to be configured in the standard start mode.

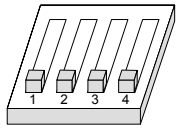
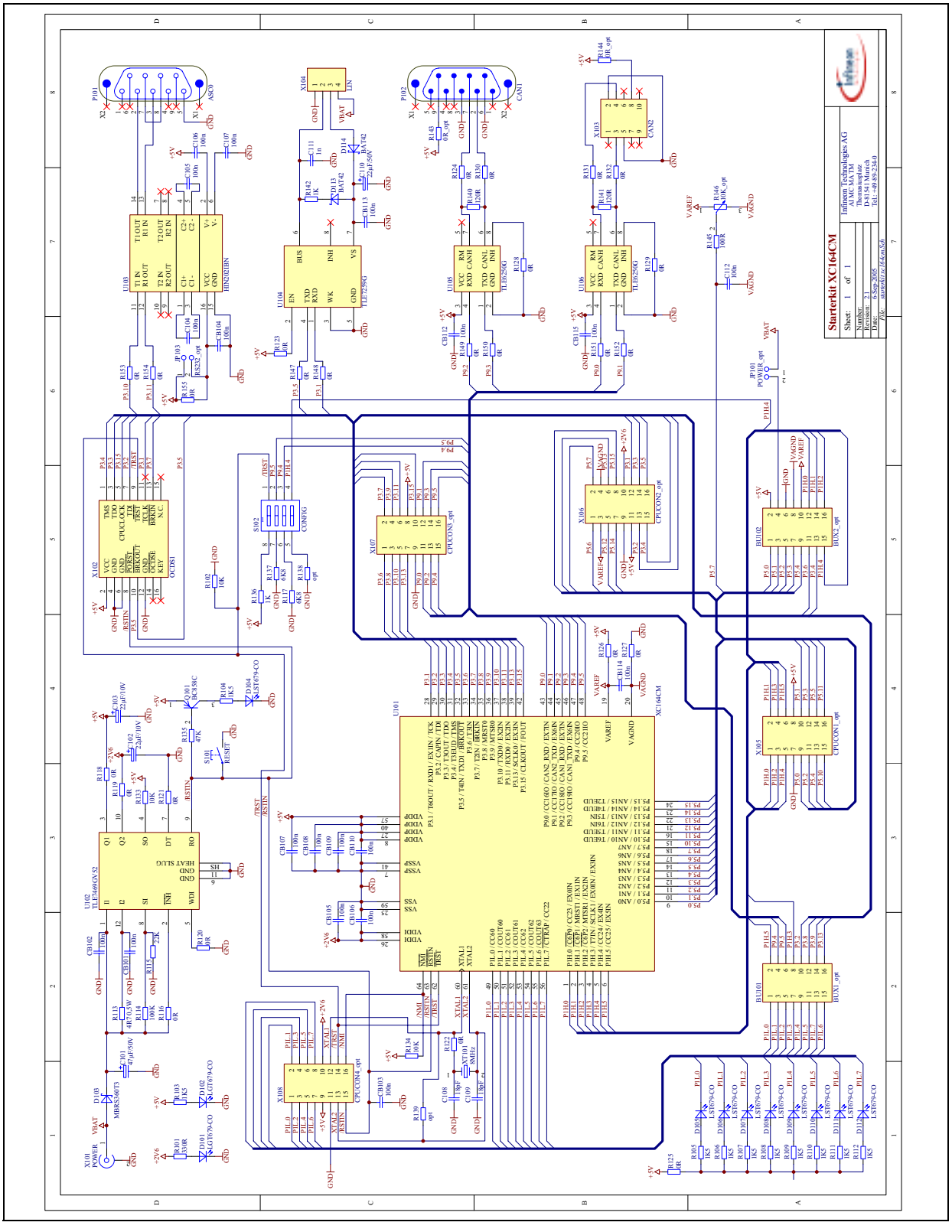


Figure 17 Standard start mode (DIP Switch S102)

After the reset buttom(blue) is pressed the program is executed from the internal flash.

6 Schematic


Starterkit XC164CM
Infineon Technologies AG
AIM MA TM
Thomas Ingelbauer
D-81541 Munich
Tel.: +49-89-234-0
Sheet: 1 of 1
Number: 1
Revision: 2.1
Date: 25-Sep-2005
File: starterkit_xc164cm.SchDoc
XC164CM
U101
U102
U103
U104
U105
U106
U107
U108
X101
X102
X103
X104
X105
X106
X107
X108
P101
P102
JP101
JP103
S101
S102
D101
D102
D103
D104
D105
D106
D107
D108
D109
D110
D111
D112
D113
D114
Q101
Q102
Q103
Q104
Q105
Q106
Q107
Q108
Q109
Q110
Q111
Q112
Q113
Q114
Q115
Q116
Q117
Q118
Q119
Q120
Q121
Q122
Q123
Q124
Q125
Q126
Q127
Q128
Q129
Q130
Q131
Q132
Q133
Q134
Q135
Q136
Q137
Q138
Q139
Q140
Q141
Q142
Q143
Q144
Q145
Q146
Q147
Q148
Q149
Q150
Q151
Q152
Q153
Q154
Q155
Q156
Q157
Q158
Q159
Q160
Q161
Q162
Q163
Q164
Q165
Q166
Q167
Q168
Q169
Q170
Q171
Q172
Q173
Q174
Q175
Q176
Q177
Q178
Q179
Q180
Q181
Q182
Q183
Q184
Q185
Q186
Q187
Q188
Q189
Q190
Q191
Q192
Q193
Q194
Q195
Q196
Q197
Q198
Q199
Q200
Q201
Q202
Q203
Q204
Q205
Q206
Q207
Q208
Q209
Q210
Q211
Q212
Q213
Q214
Q215
Q216
Q217
Q218
Q219
Q220
Q221
Q222
Q223
Q224
Q225
Q226
Q227
Q228
Q229
Q230
Q231
Q232
Q233
Q234
Q235
Q236
Q237
Q238
Q239
Q240
Q241
Q242
Q243
Q244
Q245
Q246
Q247
Q248
Q249
Q250
Q251
Q252
Q253
Q254
Q255
Q256
Q257
Q258
Q259
Q260
Q261
Q262
Q263
Q264
Q265
Q266
Q267
Q268
Q269
Q270
Q271
Q272
Q273
Q274
Q275
Q276
Q277
Q278
Q279
Q280
Q281
Q282
Q283
Q284
Q285
Q286
Q287
Q288
Q289
Q290
Q291
Q292
Q293
Q294
Q295
Q296
Q297
Q298
Q299
Q300
Q301
Q302
Q303
Q304
Q305
Q306
Q307
Q308
Q309
Q310
Q311
Q312
Q313
Q314
Q315
Q316
Q317
Q318
Q319
Q320
Q321
Q322
Q323
Q324
Q325
Q326
Q327
Q328
Q329
Q330
Q331
Q332
Q333
Q334
Q335
Q336
Q337
Q338
Q339
Q340
Q341
Q342
Q343
Q344
Q345
Q346
Q347
Q348
Q349
Q350
Q351
Q352
Q353
Q354
Q355
Q356
Q357
Q358
Q359
Q360
Q361
Q362
Q363
Q364
Q365
Q366
Q367
Q368
Q369
Q370
Q371
Q372
Q373
Q374
Q375
Q376
Q377
Q378
Q379
Q380
Q381
Q382
Q383
Q384
Q385
Q386
Q387
Q388
Q389
Q390
Q391
Q392
Q393
Q394
Q395
Q396
Q397
Q398
Q399
Q400
Q401
Q402
Q403
Q404
Q405
Q406
Q407
Q408
Q409
Q410
Q411
Q412
Q413
Q414
Q415
Q416
Q417
Q418
Q419
Q420
Q421
Q422
Q423
Q424
Q425
Q426
Q427
Q428
Q429
Q430
Q431
Q432
Q433
Q434
Q435
Q436
Q437
Q438
Q439
Q440
Q441
Q442
Q443
Q444
Q445
Q446
Q447
Q448
Q449
Q450
Q451
Q452
Q453
Q454
Q455
Q456
Q457
Q458
Q459
Q460
Q461
Q462
Q463
Q464
Q465
Q466
Q467
Q468
Q469
Q470
Q471
Q472
Q473
Q474
Q475
Q476
Q477
Q478
Q479
Q480
Q481
Q482
Q483
Q484
Q485
Q486
Q487
Q488
Q489
Q490
Q491
Q492
Q493
Q494
Q495
Q496
Q497
Q498
Q499
Q500
Q501
Q502
Q503
Q504
Q505
Q506
Q507
Q508
Q509
Q510
Q511
Q512
Q513
Q514
Q515
Q516
Q517
Q518
Q519
Q520
Q521
Q522
Q523
Q524
Q525
Q526
Q527
Q528
Q529
Q530
Q531
Q532
Q533
Q534
Q535
Q536
Q537
Q538
Q539
Q540
Q541
Q542
Q543
Q544
Q545
Q546
Q547
Q548
Q549
Q550
Q551
Q552
Q553
Q554
Q555
Q556
Q557
Q558
Q559
Q560
Q561
Q562
Q563
Q564
Q565
Q566
Q567
Q568
Q569
Q570
Q571
Q572
Q573
Q574
Q575
Q576
Q577
Q578
Q579
Q580
Q581
Q582
Q583
Q584
Q585
Q586
Q587
Q588
Q589
Q590
Q591
Q592
Q593
Q594
Q595
Q596
Q597
Q598
Q599
Q600
Q601
Q602
Q603
Q604
Q605
Q606
Q607
Q608
Q609
Q610
Q611
Q612
Q613
Q614
Q615
Q616
Q617
Q618
Q619
Q620
Q621
Q622
Q623
Q624
Q625
Q626
Q627
Q628
Q629
Q630
Q631
Q632
Q633
Q634
Q635
Q636
Q637
Q638
Q639
Q640
Q641
Q642
Q643
Q644
Q645
Q646
Q647
Q648
Q649
Q650
Q651
Q652
Q653
Q654
Q655
Q656
Q657
Q658
Q659
Q660
Q661
Q662
Q663
Q664
Q665
Q666
Q667
Q668
Q669
Q670
Q671
Q672
Q673
Q674
Q675
Q676
Q677
Q678
Q679
Q680
Q681
Q682
Q683
Q684
Q685
Q686
Q687
Q688
Q689
Q690
Q691
Q692
Q693
Q694
Q695
Q696
Q697
Q698
Q699
Q700
Q701
Q702
Q703
Q704
Q705
Q706
Q707
Q708
Q709
Q710
Q711
Q712
Q713
Q714
Q715
Q716
Q717
Q718
Q719
Q720
Q721
Q722
Q723
Q724
Q725
Q726
Q727
Q728
Q729
Q730
Q731
Q732
Q733
Q734
Q735
Q736
Q737
Q738
Q739
Q740
Q741
Q742
Q743
Q744
Q745
Q746
Q747
Q748
Q749
Q750
Q751
Q752
Q753
Q754
Q755
Q756
Q757
Q758
Q759
Q760
Q761
Q762
Q763
Q764
Q765
Q766
Q767
Q768
Q769
Q770
Q771
Q772
Q773
Q774
Q775
Q776
Q777
Q778
Q779
Q780
Q781
Q782
Q783
Q784
Q785
Q786
Q787
Q788
Q789
Q790
Q791
Q792
Q793
Q794
Q795
Q796
Q797
Q798
Q799
Q800
Q801
Q802
Q803
Q804
Q805
Q806
Q807
Q808
Q809
Q810
Q811
Q812
Q813
Q814
Q815
Q816
Q817
Q818
Q819
Q820
Q821
Q822
Q823
Q824
Q825
Q826
Q827
Q828
Q829
Q830
Q831
Q832
Q833
Q834
Q835
Q836
Q837
Q838
Q839
Q840
Q841
Q842
Q843
Q844
Q845
Q846
Q847
Q848
Q849
Q850
Q851
Q852
Q853
Q854
Q855
Q856
Q857
Q858
Q859
Q860
Q861
Q862
Q863
Q864
Q865
Q866
Q867
Q868
Q869
Q870
Q871
Q872
Q873
Q874
Q875
Q876
Q877
Q878
Q879
Q880
Q881
Q882
Q883
Q884
Q885
Q886
Q887
Q888
Q889
Q890
Q891
Q892
Q893
Q894
Q895
Q896
Q897
Q898
Q899
Q900
Q901
Q902
Q903
Q904
Q905
Q906
Q907
Q908
Q909
Q910
Q911
Q912
Q913
Q914
Q915
Q916
Q917
Q918
Q919
Q920
Q921
Q922
Q923
Q924
Q925
Q926
Q927
Q928
Q929
Q930
Q931
Q932
Q933
Q934
Q935
Q936
Q937
Q938
Q939
Q940
Q941
Q942
Q943
Q944
Q945
Q946
Q947
Q948
Q949
Q950
Q951
Q952
Q953
Q954
Q955
Q956
Q957
Q958
Q959
Q960
Q961
Q962
Q963
Q964
Q965
Q966
Q967
Q968
Q969
Q970
Q971
Q972
Q973
Q974
Q975
Q976
Q977
Q978
Q979
Q980
Q981
Q982
Q983
Q984
Q985
Q986
Q987
Q988
Q989
Q990
Q991
Q992
Q993
Q994
Q995
Q996
Q997
Q998
Q999
Q1000

Edition V 1.0
Published by Infineon Technologies AG,
D-81726 Munich, Germany

© Infineon Technologies AG 2006.
All Rights Reserved.

LEGAL DISCLAIMER:
The information given in this Application Note is given as a hint for the implementation of the Infineon Technologies component only and shall not be regarded as any description or warranty of a certain functionality, condition or quality of the Infineon Technologies component. THe Recipient of this Application Note must verify Any function described herein in the real application. Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind (including without limitation warranties of non-infringement of intellectual property rights of any third party) with respect to any and all information given in this Application Note.

Information

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office.

Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Infineon goes for Business Excellence

“Business excellence means intelligent approaches and clearly defined processes, which are both constantly under review and ultimately lead to good operating results.
Better operating results and business excellence mean less idleness and wastefulness for all of us, more professional success, more accurate information, a better overview and, thereby, less frustration and more satisfaction.”

h t t p : / /

P u b l i s h e d b y I n f i n e o n