Technical Datasheet (preliminary)

for Enhanced BasicCards
ZC3.14,
ZC3.34,
ZC3.44

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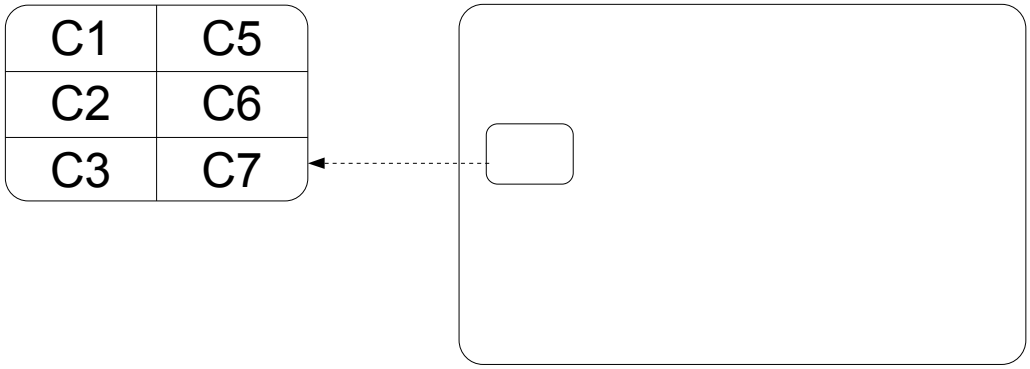
Compliance to International Standards

The listed products are compliant to several international standards, including:

- ISO/IEC 7816-1:1998 "Identification cards – Integrated circuit(s) cards – Part 1: Cards with contacts – Physical characteristics"
- ISO/IEC 7816-2:2007 "Identification cards – Integrated circuit cards – Part 2: Cards with contacts – Dimensions and location of the contacts"
- ISO/IEC 7816-3:2006 "Identification cards – Integrated circuit cards – Part 3: Cards with contacts – Electrical interface and transmission protocols"

Pinning Information

The following drawing describes the location of contacts and the assignment of symbolic names for each contact. It does not give an exact picture of form and position of contacts for the product.



PIN	Function	PIN	Function
C1	Vcc	C5	GND
C2	RST	C6	not connected
C3	CLK	C7	I/O

Note: The not connected ISO PINs C4 and C8 have been removed in 6 PIN version of the chip module as used here.

Electrical Specifications

Supported Ratings According to ISO/IEC 7816-3

Class According ISO7816-3	Vcc		Icc	
	Min	Max	Min	Max
Class A	4.5 V	5.5 V		60 mA
Class B	2.7 V	3.3 V		50 mA
Class C	Not supported			

Other ISO compliant supported ratings

	Min	Max
External clock f_{CLK}	1 MHz	5 MHz
Operating Temperature of the Card	0 °C	50 °C

The above table states values according to ISO standard, which are supported by this product. See section “Compliance to International Standards“ and corresponding international standard documents for more details. See also “Standard Operating Conditions“ below for more exact ratings.

Notes:

- Class C is not supported.
- ISO/IEC refers to an operating temperature in between 0°C and 50°C.
- Within this temperature range, both the chip **and the card** will not be damaged

Standard Operating Conditions

The product operates without malfunctions in operating conditions specified below.

	Min	Typ	Max
Vcc	2.7V	3V / 5V	5.5V
Icc (Vcc=5V)		2mA	10 mA
Icc (Vcc=3V)		2mA	6 mA
f_{CLK}	1 MHz	3.57MHz	5 MHz
Operating Temperature	-25°C	25°C	+85°C

Note: The operating temperature applies to the microchip. The plastic card may be damaged even if operating temperature is in range specified above! For ratings applying to the card material see section Card Materials.

Absolute Ratings

Stresses above these listed maximum ratings may cause permanent damage to the device. Exposure beyond specified electrical characteristics may affect device reliability or cause malfunction. Note that plastic card may be damaged even if the storage temperature is in specified range!

	Condition	Min	Max
Power Supply (Vcc to GND)		-0.3 V	+5.7 V
Voltage at RST, CLK, I/O		GND -0.3 V	Vcc + 0.3 V
Storage Temperature	Relative Humidity < 20%	-40°C	+125°C

Note: The storage temperature applies to the microchip. The plastic card may be damaged even if storage temperature is in range specified above! For ratings applying to the card material see section Card Materials.

Card Materials

Following ratings apply to the card material only. For ratings about the chip see section **Electrical Specifications** and sub sections.

Absolute Ratings

Stresses above these listed maximum ratings may cause permanent damage to the card material.

	Condition	Min	Max
Temperature	Material: Standard	-30°C	+50°C
	Material: HT85	-30°C	+85°C

EEPROM

Endurance	> 100.000 hardware write cycles > 20.000 or more total software writes to EEPROM
Data retention time	> 10 Years

Remark: A typical endurance of more than 100.000 write cycles is specified by hardware manufacturer. Since each software write to EEPROM through BasicCard Virtual Machine results in multiple hardware write cycles, the number of minimum supported software writes to EEPROM is less. Multiple write cycles per software write are needed to ensure transaction save EEPROM writes, by means that each software write to EEPROM is either fully completed or fully discarded (if power to card is interrupted or card is reset) and thus the EEPROM is always in a valid state.

Order Informations

Order Number	Packaging	Device	Available Variants (please specify when ordering)
13.003.0109	Chip modul	Enhanced BasicCard ZC3.14	REV D
13.003.0110	Chip modul	Enhanced BasicCard ZC3.34	REV D
13.003.0111	Chip modul	Enhanced BasicCard ZC3.44	REV D
78.000.0113	Chip card white	Enhanced BasicCard ZC3.14	REV D
78.000.0114	Chip card white	Enhanced BasicCard ZC3.34	REV D
78.000.0115	Chip card white	Enhanced BasicCard ZC3.44	REV D

Note: Cards printed or encoded according to customer specification will have a specific order number assigned. Above order codes apply to none customer specific cards only.

Legal Informations

The described products are compliant to EU RoHS Legislation (2002/95/EC)

Software Notes

See http://www.basiccard.com for software and development reference (*BasicCard Developer Manual*)

Differences in ZC3.x Family Members

The following sections describe the changes and common characteristics of ZeitControl Enhanced BasicCards.

Differences between ZC3.7 and ZC3.9

Both share the same source code for BasicCard OS implementation. Beside EEPROM size and thus location of certain EEPROM areas in memory there are no differences.

Both BasicCards are discontinued and not available anymore.

Differences between ZC3.12, ZC3.32, ZC3.42 and ZC3.13, ZC3.33, ZC3.43

All share the same source code for BasicCard OS implementation. Beside EEPROM size and thus location of certain EEPROM areas in memory there are no differences.

Both BasicCards are discontinued and not available anymore.

Differences between ZC3.14, ZC3.34 and ZC3.44

All share the same source code for BasicCard OS implementation. Beside EEPROM size and thus location of certain EEPROM areas in memory there are no differences.

The Enhanced BasicCards of type ZC3.x4 replace previous Enhanced BasicCards of type ZC3.7, ZC3.9, ZC3.x2 and ZC3.x3.

Differences between replaced BasicCards (ZC3.7, ZC3.9, ZC3.x2, ZC3.x3) compared to ZC3.14, ZC3.14, ZC3.34 (further referred to as ZC3.x4)

- The chip hardware platform has been changed
- ZC3.x4 has been developed (ported) based on source code from ZC3.x3. Only following functional changes has been made to new source code.
- ATR: ZC3.7 and ZC3.9 uses an ATR with no TA1 which means the default value of &H11 is assumed resulting in a typical transfer speed of 9600 bps. ZC3.x4 cards (as well as ZC3.x2 or ZC3.x3 cards) are faster and thus specifies TA1=&H18 which when used by reader results in a typical transfer speed of 115200bps.
- EEPROM writing: EEPROM blocks has to be written using a certain minimum size for each block, the page size. ZC3.7 and ZC3.9 use a smaller page size, while all ZC3.xx (ZC3.x2, ZX3.x3, ZC3.x4) have a larger page size. This has caused changes to EEPROM writing mechanisms, which shall not be functional visible to the user.

Migration from ZC3.7, ZC3.9, ZC3.12, ZC3.32, ZC3.42, ZC3.13, ZC3.33 or ZC3.43 to ZC3.14, ZC3.34 or ZC3.44

Choose a matching new BasicCard version according to following table:

Previously Used BasicCard	Recommended Replacement BasicCard
ZC3.7	ZC3.14
ZC3.9	ZC3.34
ZC3.12	ZC3.14
ZC3.32	ZC3.34
ZC3.42	ZC3.44
ZC3.13	ZC3.14
ZC3.33	ZC3.34
ZC3.43	ZC3.44

While we recommend to develop for latest available revision of specified type, any available revision may be used.

Download and install latest development software. See http://www.basiccard.com, “Free Download”.

Create a backup copy of your existing source code.

Start the “BasicCard Development Environment” and open the existing project file. If none exists, create a new one. Open the settings for the card project and change the target BasicCard type according your chosen replacement BasicCard type. Recompile your program and download it to one of you new BasicCards (replacement BasicCard type). See BasicCard manual for details or contact ZeitControl (development@zeitcontrol.de) for support.

Try your new card within your target system extensively. If you discover problems, check the following:

- Check if your source code contains a custom ATR declaration. A custom ATR declaration may look as follows:
  - #pragma ATR(...
  - Declare Binary ATR = ..
- If a custom ATR declaration exists, contact ZeitControl (development@zeitcontrol.de). Provide your custom ATR declaration within your email. Zeitcontrol will check this declaration for compliance and will provide a replacement to be used with new card type.
- If no custom ATR is declared, add an ATR declaration as follows:
  - #pragma ATR(FI=1, DI=1)
  - Compile and download the changed program. Try it in your target environment again. **If this does not solve your problem** remove the previously defined pragma ATR statement and try the following ATR declaration instead:[1]
    - For ZC3.7 replacement
      Declare Binary ATR = &H3B, &HEF, &H00, &H00, &H81, &H31, &H20, &H75, &H42, &H61, &H73, &H69, &H63, &H43, &H61, &H72, &H64, &H20, &H5A, &H43, &H33, &H2E, &H37
    - For ZC3.9 replacement
      Declare Binary ATR = &H3B, &HEF, &H00, &H00, &H81, &H31, &H20, &H75, &H42, &H61, &H73, &H69, &H63, &H43, &H61, &H72, &H64, &H20, &H5A, &H43, &H33, &H2E, &H39
    - For ZC3.12 Rev A replacement
      Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H31, &H32, &H20, &H52, &H45, &H56, &H20, &H41
    - For ZC3.12 Rev B replacement
      Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H31, &H32, &H20, &H52, &H45, &H56, &H20, &H42
    - For ZC3.13 Rev C replacement
      Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H31, &H33, &H20, &H52, &H45, &H56, &H20, &H43
    - For ZC3.32 Rev A replacement
      Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H33, &H32, &H20, &H52, &H45, &H56, &H20, &H41
    - For ZC3.32 Rev B replacement
      Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H33, &H32, &H20, &H52, &H45, &H56, &H20, &H42
    - For ZC3.33 Rev C replacement
      Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H33, &H33, &H20, &H52, &H45, &H56, &H20, &H43

1 This will specify the same ATR as used by ZC3.7 respective ZC3.9, with one Exception. TC1 is set to 0 instead of FFh, which is not supported by new card.

- For ZC3.42 Rev A replacement
  Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H34, &H32, &H20, &H52, &H45, &H56, &H20, &H41
- For ZC3.42 Rev B replacement
  Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H34, &H32, &H20, &H52, &H45, &H56, &H20, &H42
- For ZC3.43 Rev C replacement
  Declare Binary ATR = &H3B, &HBC, &H18, &H00, &H81, &H31, &H20, &H75, &H5A, &H43, &H33, &H2E, &H34, &H33, &H20, &H52, &H45, &H56, &H20, &H43

- If this does not solve your problem, contact ZeitControl (development@zeitcontrol.de).