



Spec. Draft of SecurityCore4.1

System Copy Protection

V2.11

2014. 06

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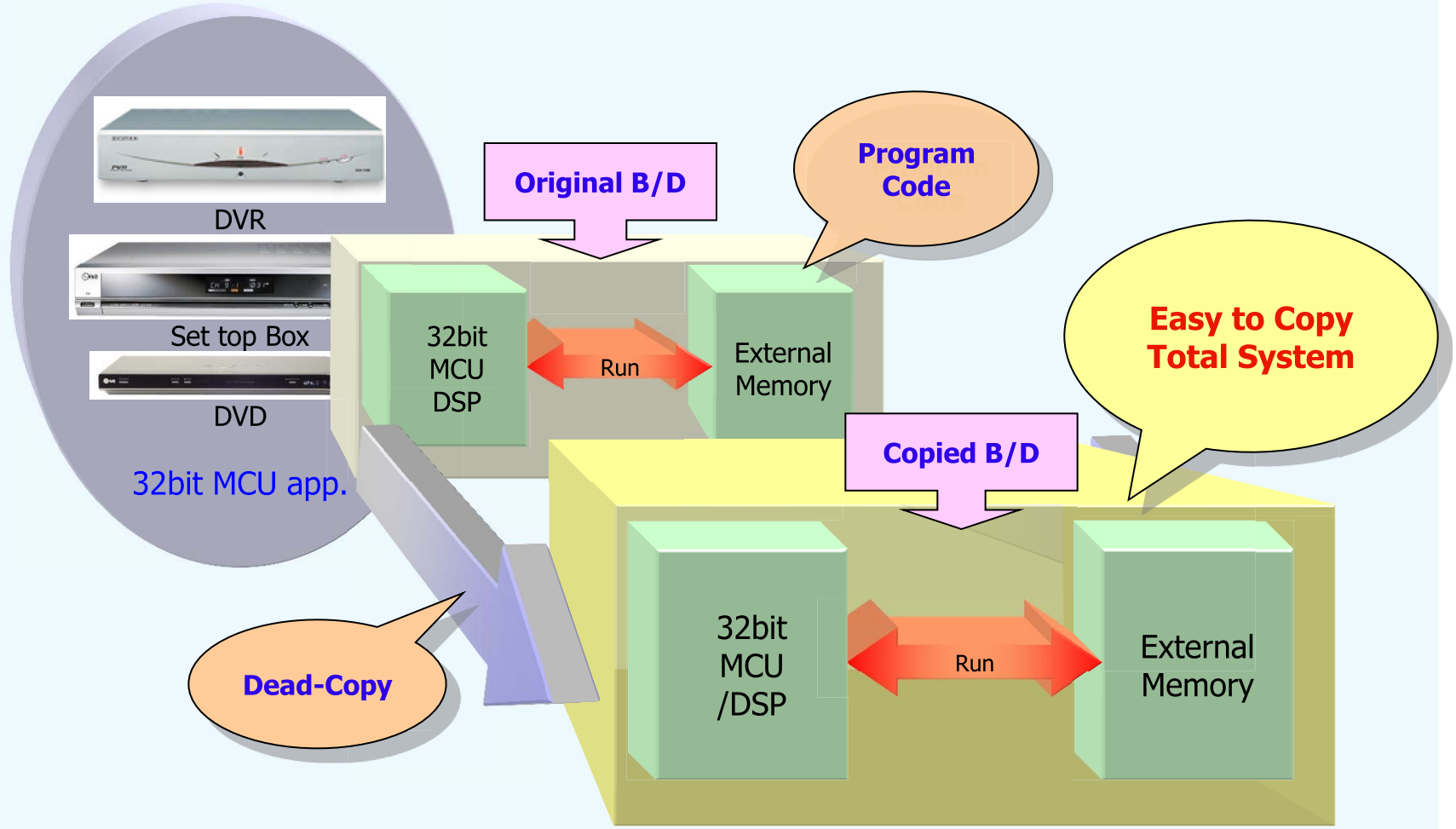
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1. What's Copy Protection?

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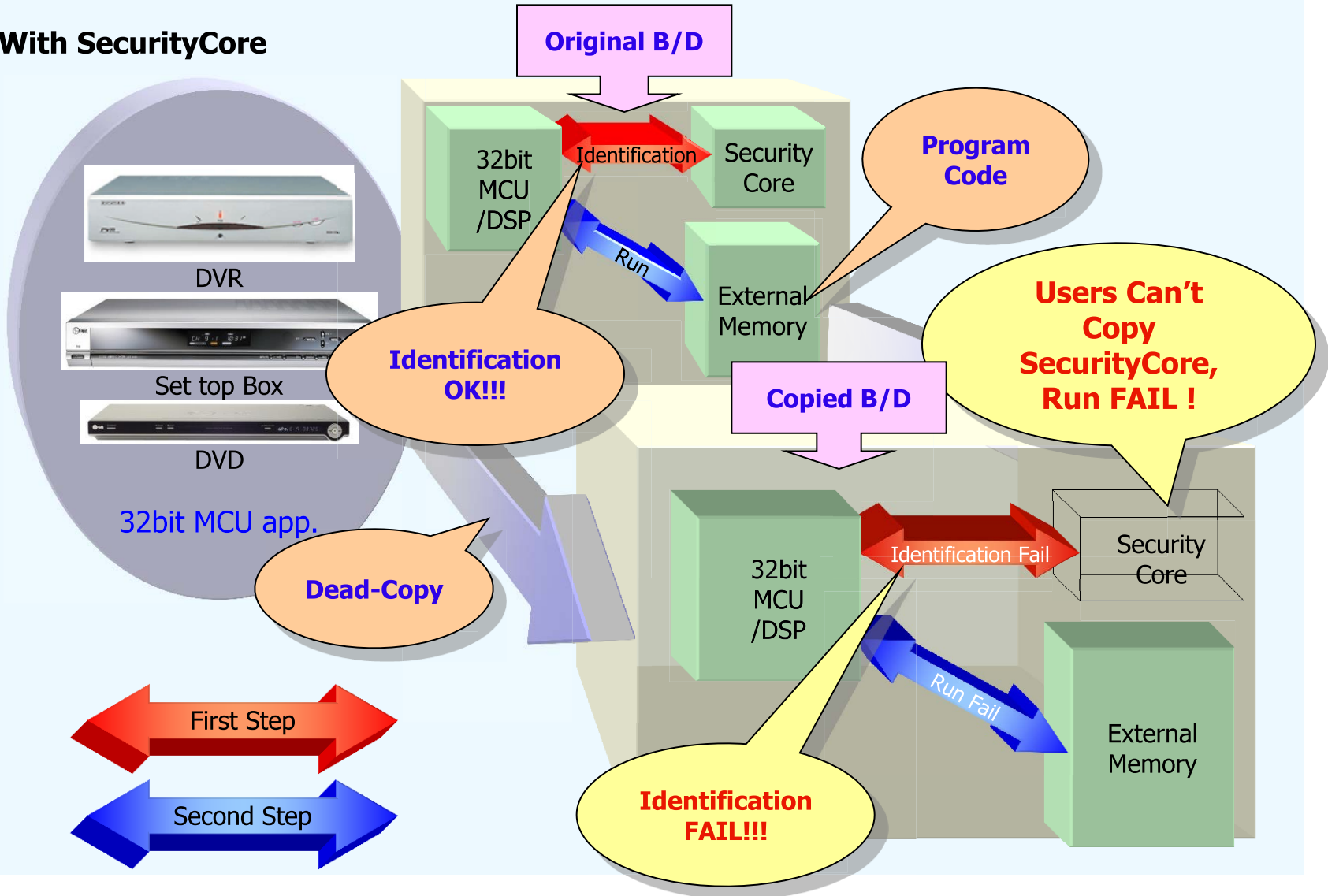
◆ Without SecurityCore



1. What's Copy Protection? (Cont'd)

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◆ With SecurityCore



2. Product Overview

- ◆ The solution of System Copy Protection.
- ◆ Support a unique identification number
- ◆ Inventory Tracking
- ◆ Customizing Unique Algorithm

3. Features

◆ Security

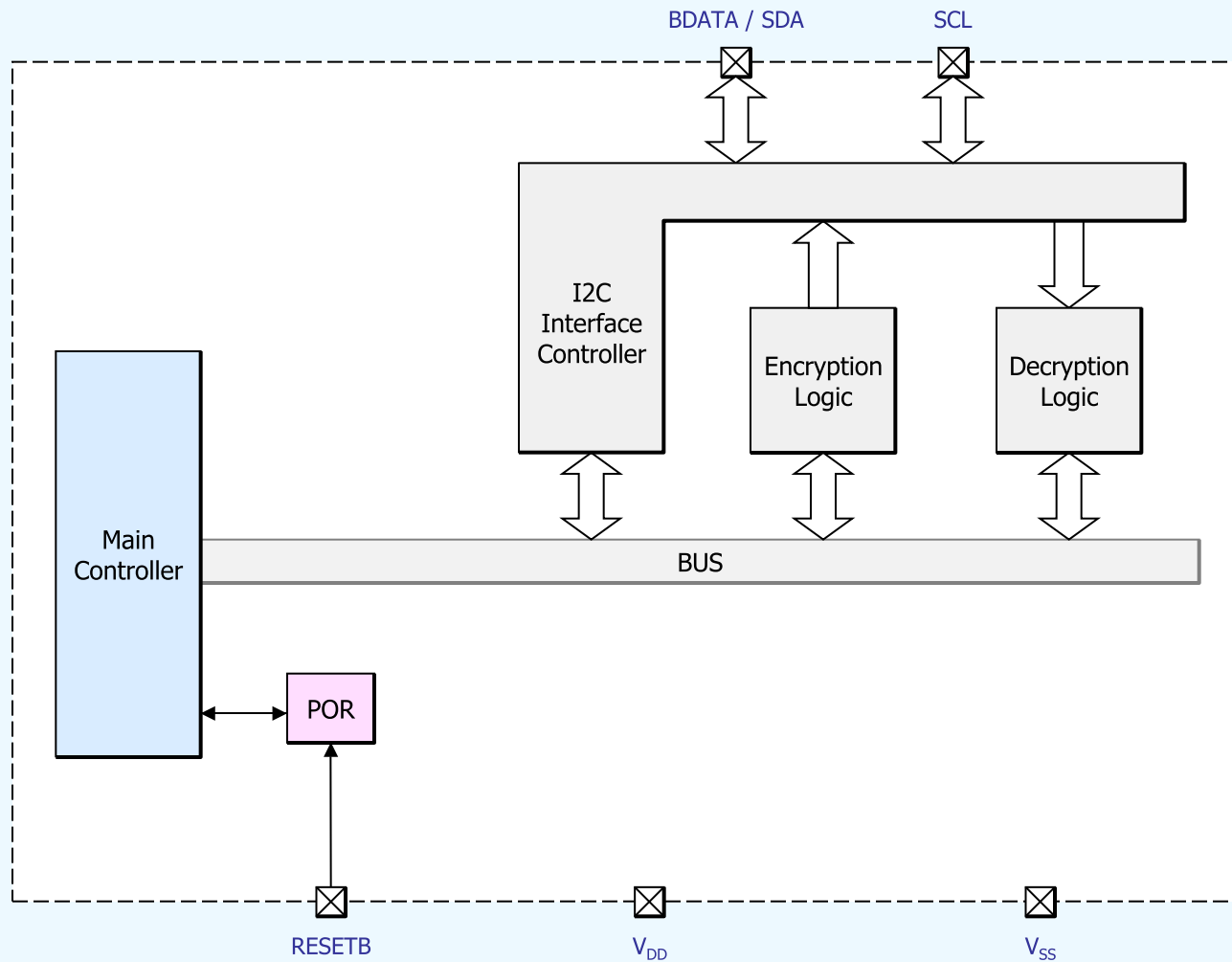
- ✓ Support Random Number Generation
- ✓ Encoder Read Protect
- ✓ Unique Algorithm : 96 Bit Encryption
- ✓ Provide Unique SEED Key

◆ Operation

- ✓ 2.7 ~ 5.5 Volts Operation
- ✓ -40 °C to 85 °C operating temperature
- ✓ Active current : Max. 1mA @3.3V, 2MHz
- ✓ Stop current : Max. 1uA (All Clock Off)
- ✓ Program Interface : I2C Interface
- ✓ E.S.D. protection up to 2,000V
- ✓ Package : 8-SOIC

4. Block Diagram

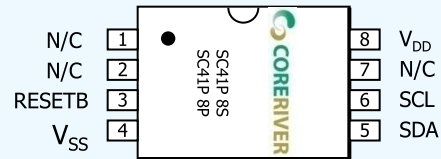
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5. Pin Configurations

◆ SecurityCore4.1

✓ I2C interface



[8-SOIC]

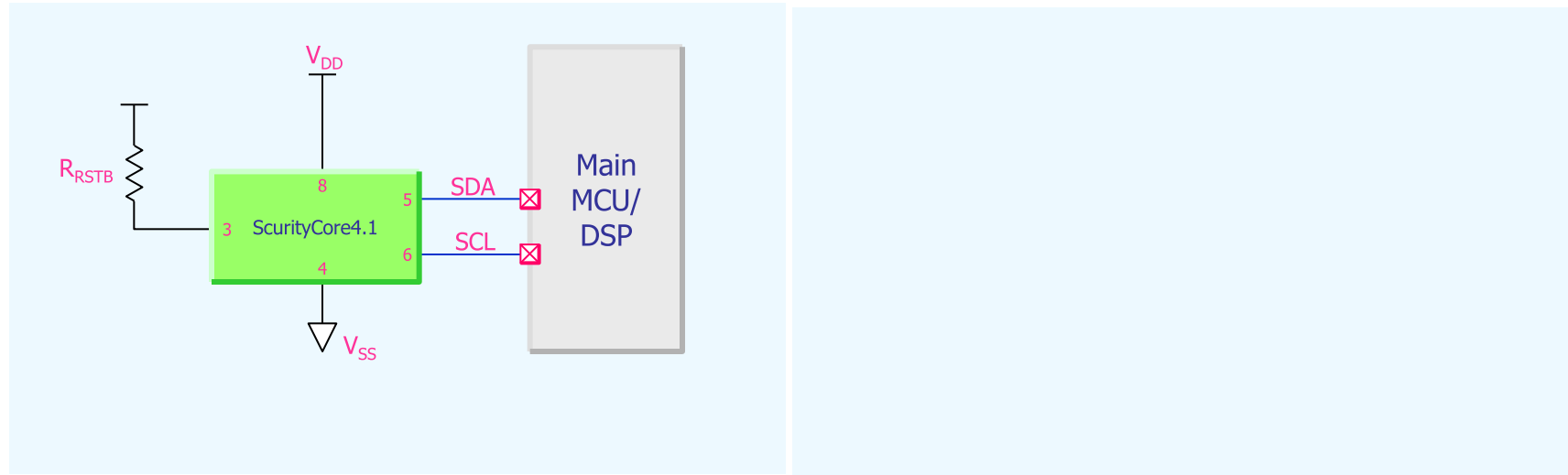
6. Pin Descriptions

◆ SecurityCore4.1

| Symbol | Direction | Description | Share Pins |
|----------|--------------|---|------------|
| V_{DD} | | Voltage Power Source | - |
| V_{SS} | | Voltage Power Ground | - |
| SDA | Input/Output | <ul style="list-style-type: none"> ▪ Data I/O | - |
| SCL | Input/Output | <ul style="list-style-type: none"> ▪ Clock I/O | - |
| RESETB | Input/Output | <ul style="list-style-type: none"> ▪ External Reset Input Signal (Default) ▪ Bit Programmable | - |
| OTHERS | | <ul style="list-style-type: none"> ▪ Data I/O | - |

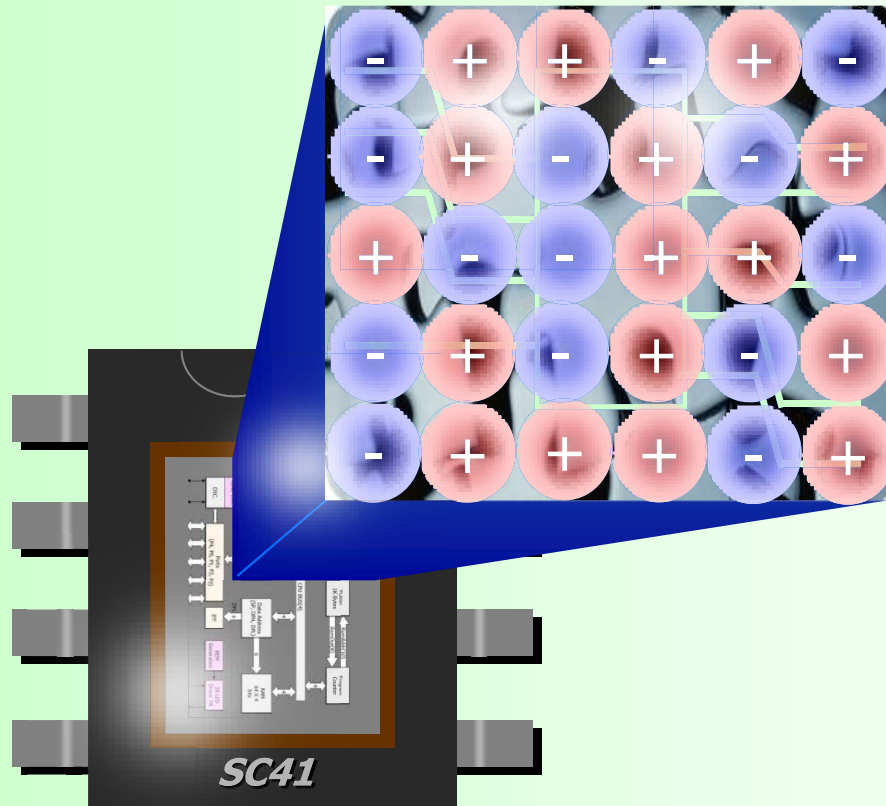
7. Application Circuit

◆ I2C Interface



8. Strong Point of CORERIVER SC41 (1/2)

- ◆ SC41 stores a security algorithm as extremely small electric charges.

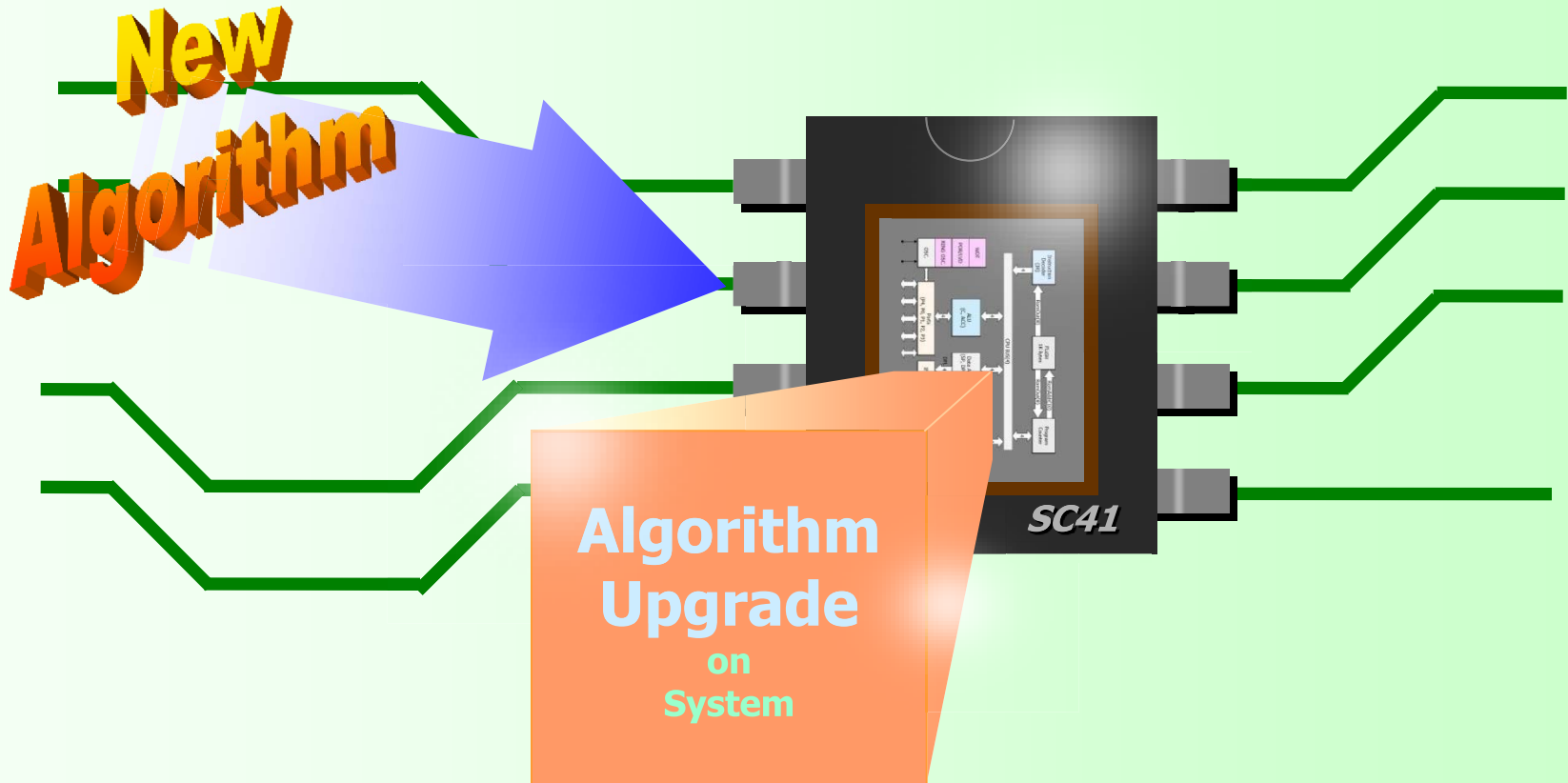


- ✓ The security algorithm is not hard-wired.
- ✓ It is really impossible to find it by de-cap.

8. Strong Point of CORERIVER SC41 (2/2)

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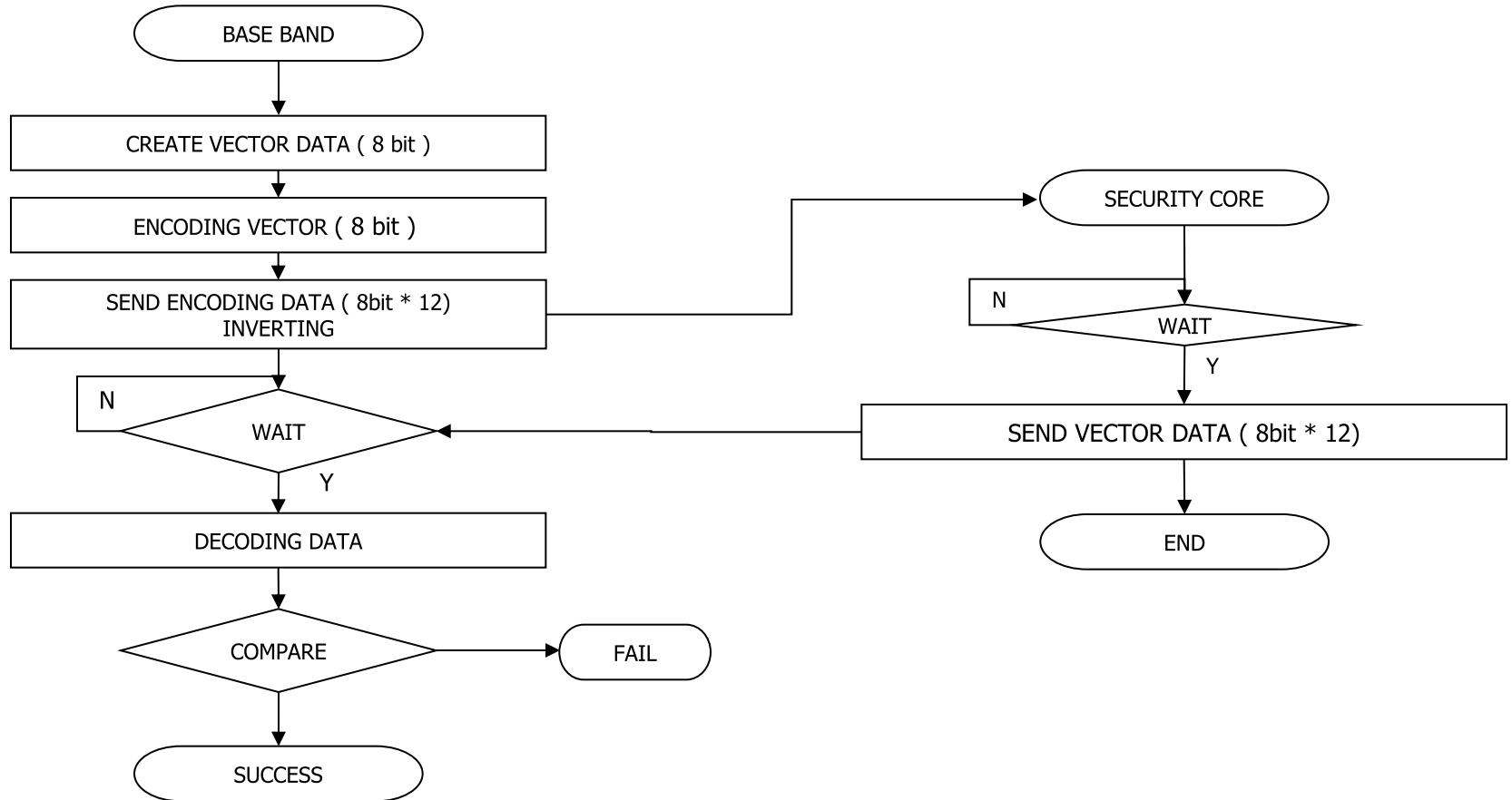
◆ Upgrade function in the field.



- ✓ CORERIVER SC41 can upgrade the security algorithm on a used system.
- ✓ To prevent the security algorithm from being cracked, you can replace it by a new one.

9. Security Flow

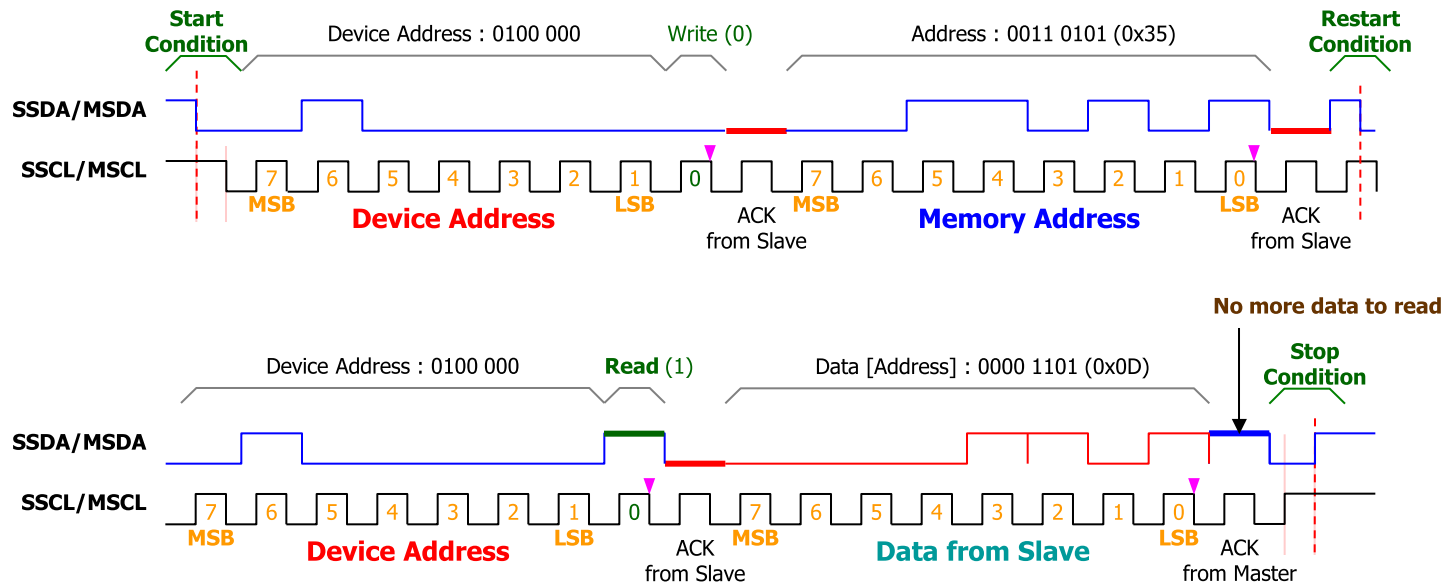
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10.1 I2C Interface : 10-bit Addressing (Slave)

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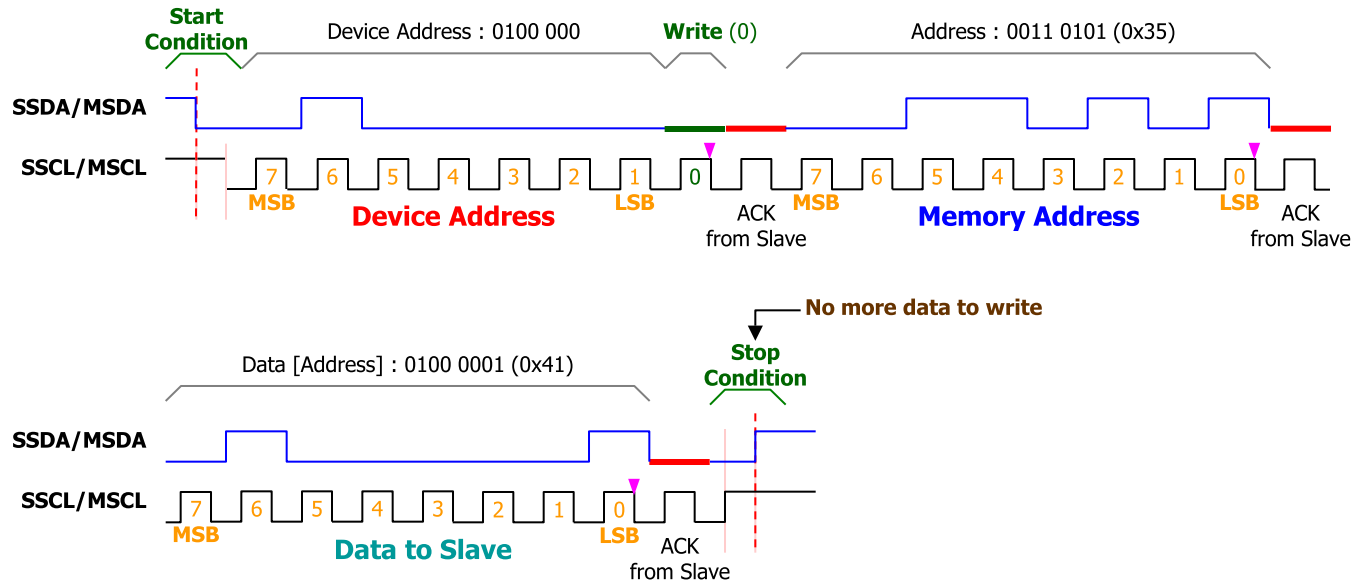
◆ Single Byte Read with Memory Address



10.2 I2C Interface : 10-bit Addressing (Slave)

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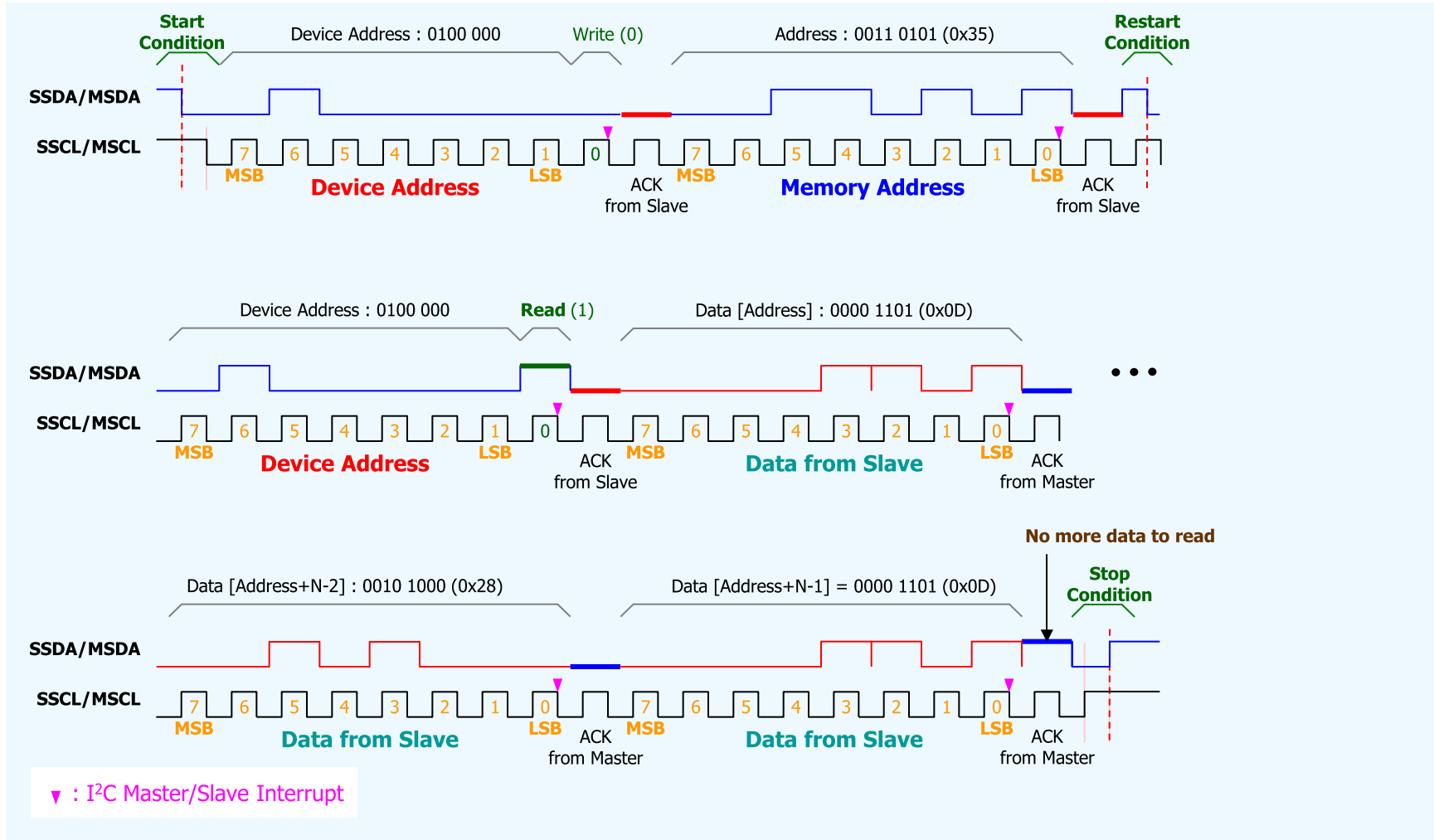
◆ Single Byte Write with Memory Address



10.3 I2C Interface : 10-bit Addressing (Slave)

Confidential

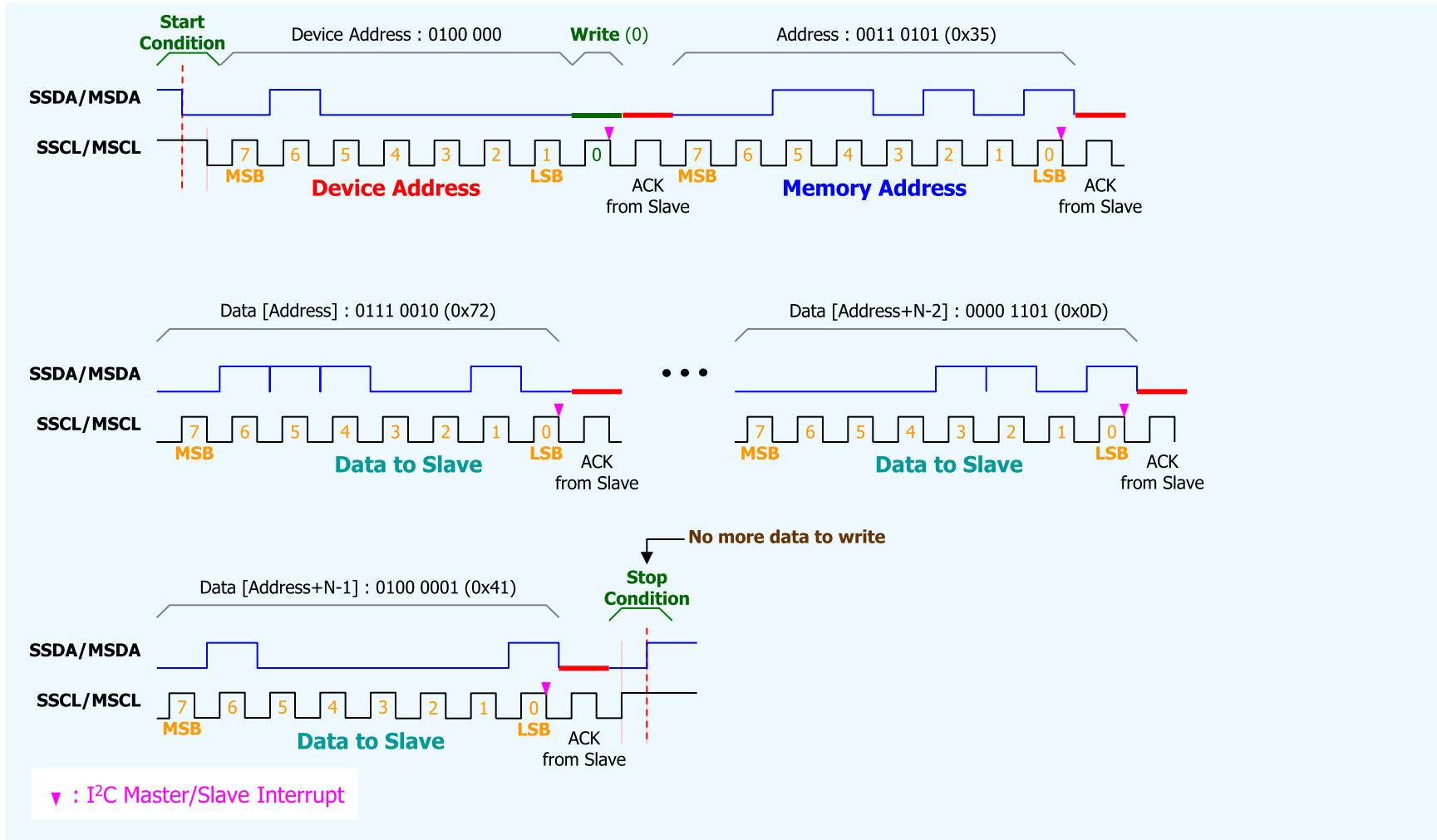
◆ Multi (N) Bytes Read with Memory Address



10.4 I2C Interface : 10-bit Addressing (Slave)

Confidential

◆ Multi (N) Bytes Write with Memory Address



10.5 I2C Interface : Processing Time

Confidential

◆ I2C Interface - Delay

| No | Process | Time |
|----|--|-------|
| 1 | Chip Address ~ Data Byte Delay | 20us |
| 2 | Data Byte ~ Data Byte Delay | 20us |
| 3 | Writing ~ Read Delay (Algorithm processing time) | 100ms |

11. I2C Speed

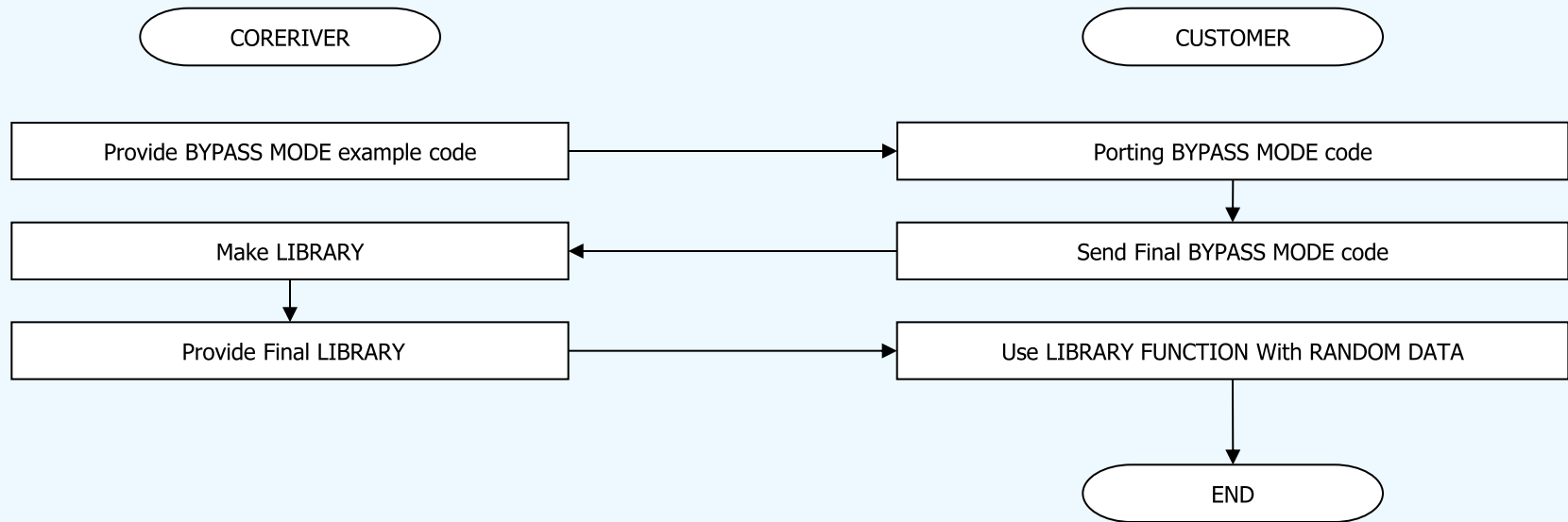
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| Device | I2C Min Speed | I2C Max Speed |
|------------------|---------------|---------------|
| SecurityCore 4.1 | 3KHz | 400KHz |

* Recommended I2C Speed : 30KHz ~ 100KHz.

12. How to support Library

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NOTE : If CORERIVER don't have customer's development environment, we can borrow customer's IDE or visit customer's company to make library.

13. Absolute Maximum Ratings

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| Items | Conditions | Ranges |
|--|--------------------|----------------------------|
| Voltage on any pin relative to Ground | - | -0.5V to ($V_{DD}+0.5V$) |
| Voltage in V_{DD} relative to Ground | - | -0.5V to 6.5V |
| Output Voltage | - | -0.5V to ($V_{DD}+0.5V$) |
| Output Current High | One I/O pin active | -25mA |
| | All I/O pin active | -100mA |
| Output Current Low | One I/O pin active | +30mA |
| | All I/O pin active | +150mA |
| Operating Temperature | - | -40 °C to 85 °C |
| Storage Temperature | - | -65 °C to +150 °C |
| Soldering Temperature | - | Peak 260 °C for 10 seconds |

14 DC Characteristics

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* TA = -40 °C ~ +85 °C, V_{DD} = 2.7V ~ 5.5V unless otherwise specified.

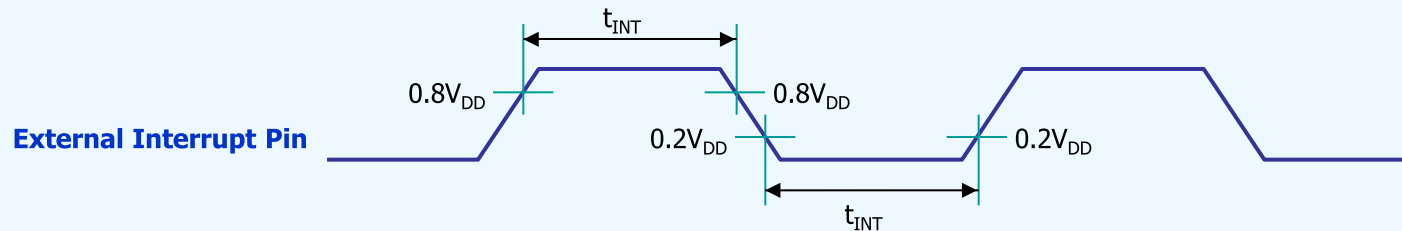
| Parameter | Symbol | Pin | Conditions | Value | | | Unit |
|-----------------------|-------------------|----------|---|-------------------------|------|-------------------------|------|
| | | | | Min. | Typ. | Max. | |
| Input Low Voltage | V _{IL} | BDATA | V _{DD} = 2.7V~5.5V | -0.5 | - | 0.2V _{DD} -0.1 | V |
| Input high Voltage | V _{IH} | BDATA | V _{DD} = 2.7V~5.5V | 0.2V _{DD} +1.0 | - | V _{DD} +0.5 | V |
| Output Low Voltage | V _{OL1} | BDATA | I _{OL} = 20mA @V _{DD} =5V (I _{OL} = 5mA @V _{DD} =2.6V) | - | - | 0.3V _{DD} | V |
| | V _{OL2} | RESETB | I _{OL} = 4mA @V _{DD} =5V | - | - | 0.3V _{DD} | |
| Output High Voltage | V _{OH} | BDATA | I _{OH} = -15mA @V _{DD} =5V (I _{OH} = -1.5mA @V _{DD} =3V) | 0.7V _{DD} | - | - | V |
| | V _{OHP1} | BDATA | I _{OH} = -40uA @V _{DD} =5V (I _{OH} = -20uA @V _{DD} =3V) | 0.7V _{DD} | - | - | V |
| Input Leakage Current | I _{IL} | All pins | V _{IN} = V _{IH} or V _{IL} | - | - | ±1 | μA |
| Pin Capacitance | C _{IO} | All | V _{DD} = 5V | - | 10 | - | pF |

15. AC Characteristics

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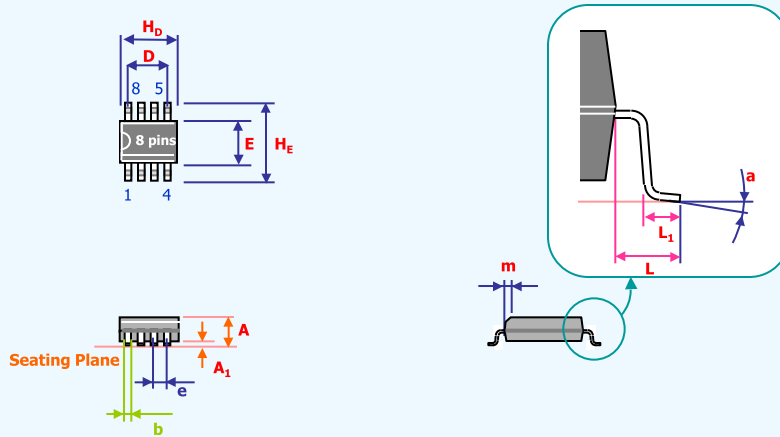
* TA = -40 °C ~ +85 °C unless otherwise specified.

| Parameter | Symbol | Pin | Conditions | Value | | | Unit |
|--------------------------------|------------------|--------------------|----------------------------|-------|------|------|------------------|
| | | | | Min. | Typ. | Max. | |
| Operating Frequency | F _{sys} | XTAL2 | V _{DD} = 5V ± 10% | 1 | - | 24 | MHz |
| | | | V _{DD} = 3V ± 10% | 1 | - | 12 | |
| External Interrupt Input Width | t _{INT} | External Interrupt | V _{DD} = 5V ± 10% | 4 | - | - | F _{osc} |
| | | | V _{DD} = 3V ± 10% | 4 | - | - | |



16. Package Dimensions : 8-SOIC

Confidential



[8-SOIC]

| Symbol | Dimension in Inches | | | Dimension in mm | | |
|--------|---------------------|-------|-------|-----------------|------|------|
| | Min. | Nom. | Max. | Min. | Nom. | Max. |
| A | 0.093 | 0.099 | 0.104 | 2.35 | 2.45 | 2.65 |
| A_1 | 0.004 | 0.008 | 0.012 | 0.10 | 0.20 | 0.30 |
| b | 0.014 | 0.016 | 0.019 | 0.35 | 0.42 | 0.49 |
| D | - | 0.150 | - | - | 3.81 | - |
| E | 0.150 | 0.153 | 0.157 | 3.80 | 3.90 | 4.00 |
| H_b | 0.189 | 0.193 | 0.197 | 4.80 | 4.90 | 5.00 |
| H_e | 0.234 | 0.239 | 0.244 | 5.95 | 6.07 | 6.20 |
| L | 0.038 | 0.043 | 0.048 | 0.97 | 1.08 | 1.2 |
| L_1 | 0.022 | 0.027 | 0.032 | 0.58 | 0.70 | 0.82 |
| a | 0° | - | 8° | 0° | - | 8° |
| e | 0.050 BSC | | | 1.27 BSC | | |
| m | 0.010 | 0.015 | 0.020 | 0.25 | 0.37 | 0.50 |

Notes:

1. Dimension D & E include mold mismatch and are determined at the mold parting line.
2. General appearance spec. should be based on final visual inspection spec.

Appendix : Update History

- ◆ V1.0
 - ✓ spec draft
- ◆ V1.1
 - ✓ What's copy protection Image.
- ◆ V1.2
 - ✓ I2C Interface.
- ◆ V1.3
 - ✓ Package Dimensions.
- ◆ V1.4
 - ✓ SecurityCore3.0 Addition.
- ◆ V1.5
 - ✓ SecurityCore3.0 Strong Point Addition.
- ◆ V1.6
 - ✓ SecurityCore3.0 power slop Addition
- ◆ V1.7
 - ✓ SecurityCore4.0 Addition
- ◆ V1.8
 - ✓ SecurityCore4.1 Addition
- ◆ V1.9
 - ✓ SecurityCore412 Addition
- ◆ V2.0
 - ✓ SecurityCore412 strong point Addition
- ◆ V2.1 ~ V2.6
 - ✓ SecurityCore412 Addition
- ◆ V2.7
 - ✓ SecurityCore3.0 remove.
 - ✓ Algorithm & etc modify.
- ◆ V2.8
 - ✓ Power Characteristics remove.
 - ✓ I2
 - ✓ C Speed change (10KHz -> 100KHz)
- ◆ V2.9
 - ✓ SS of SecurityCore4.1 only
 - ✓ Update I2C single byte Read/Write
- ◆ V2.11
 - ✓ Title changing : SecurityCore4.1