SD

Spec. Draft of SecurityCore4.1

System Copy Protection

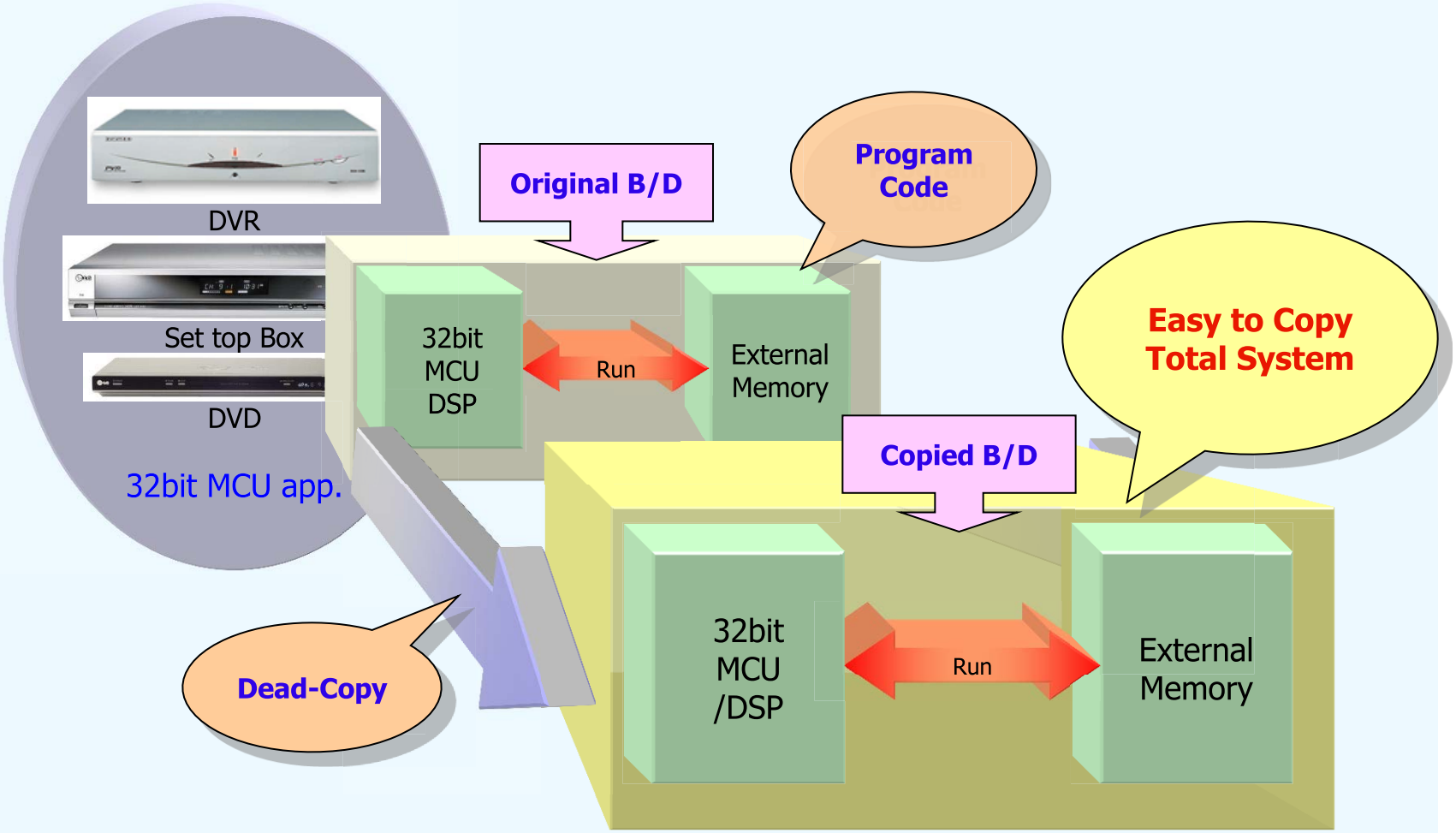
V2.11

2014. 06

Contents

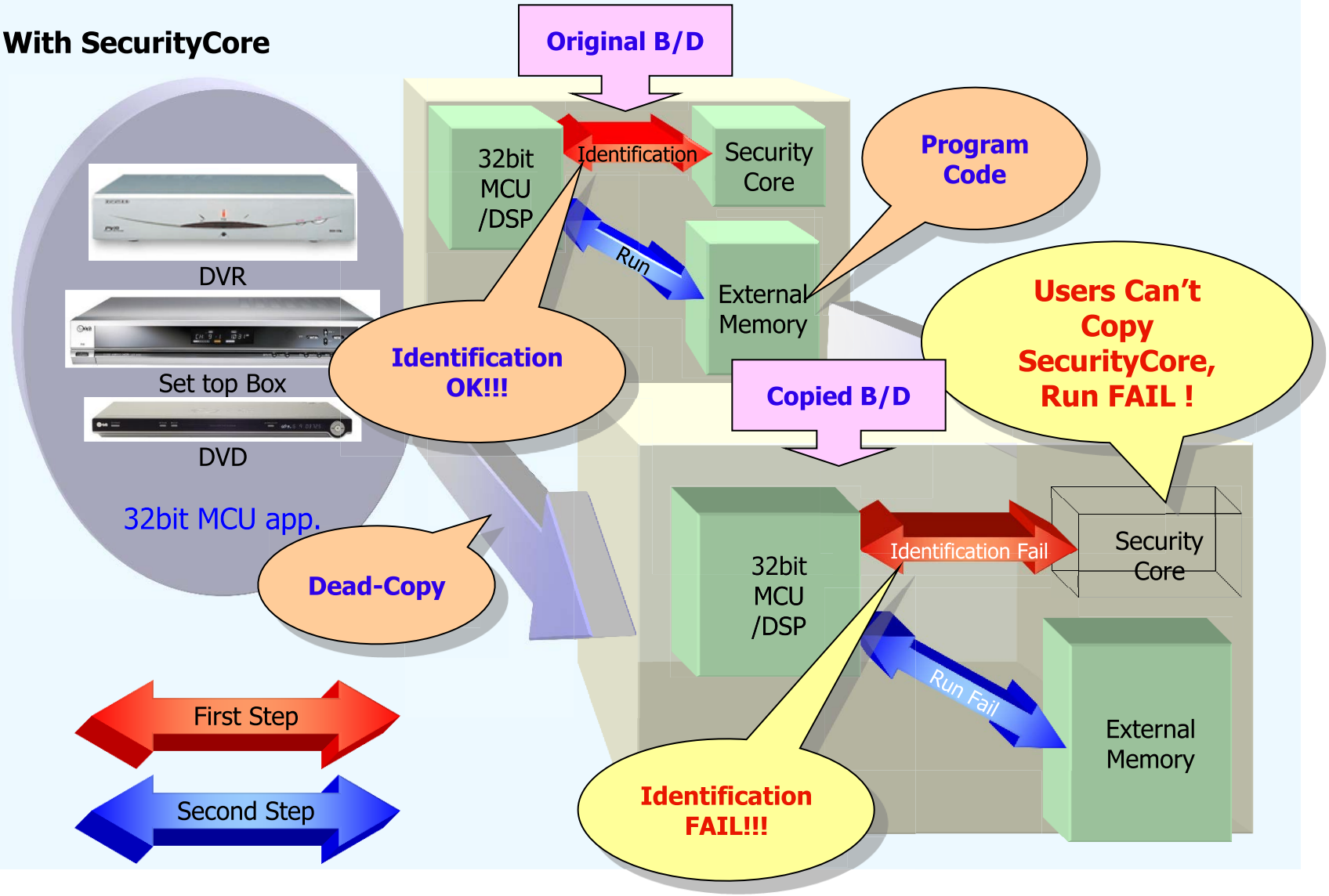
1. What's Copy Protection?

◆ **Without SecurityCore**



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

◆ **With SecurityCore**



2. Product Overview

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

3. Features

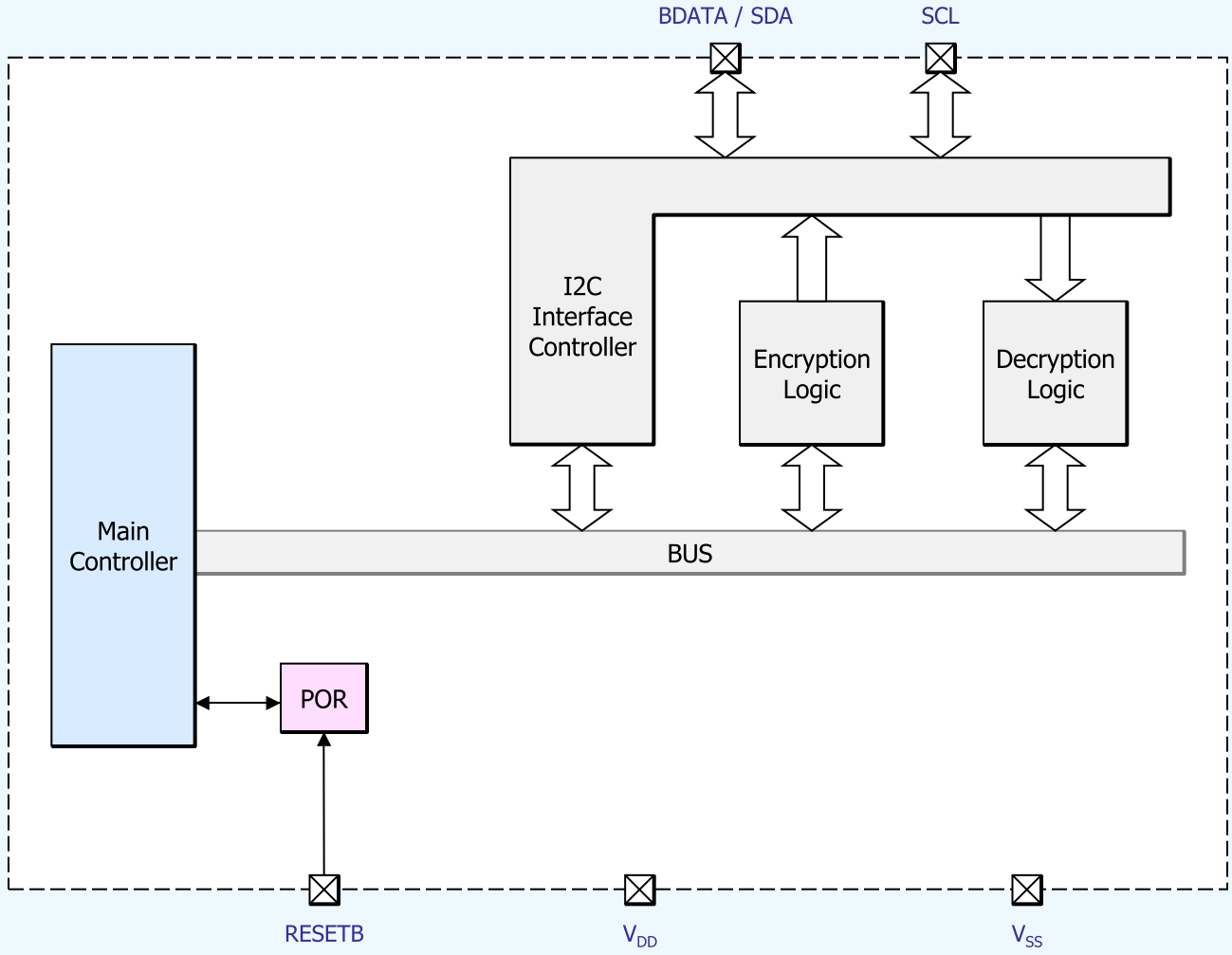
Security

- ✓ 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

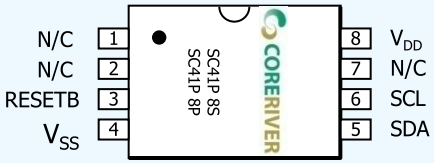
4. Block Diagram



5. Pin Configurations

◆ SecurityCore4.1

✓ I2C interface



[8-SOIC]

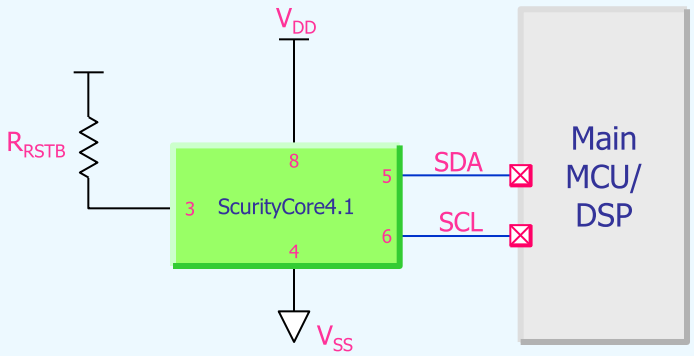
6. Pin Descriptions

SecurityCore4.1

Symbol	Direction	Description	Share Pins
V_{DD}		Voltage Power Source	-
V_{SS}		Voltage Power Ground	-
SDA	Input/Output	▪ Data I/O	-
SCL	Input/Output	▪ Clock I/O	-
RESETB	Input/Output	▪ External Reset Input Signal (Default) ▪ Bit Programmable	-
OTHERS		▪ Data I/O	-

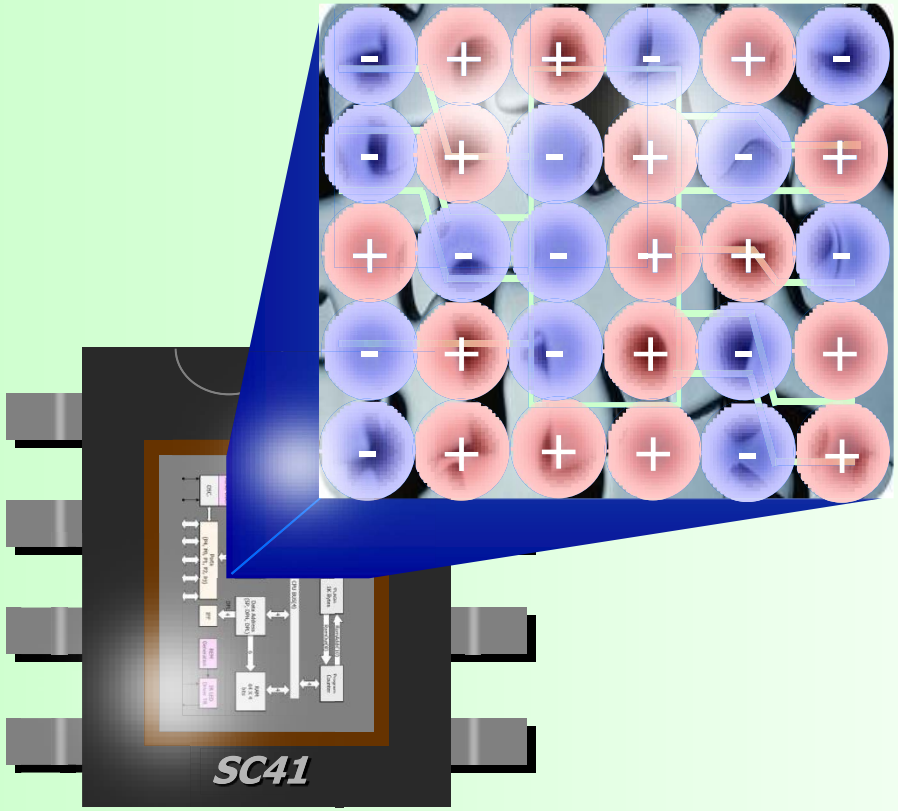
7. Application Circuit

◆ I2C Interface



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

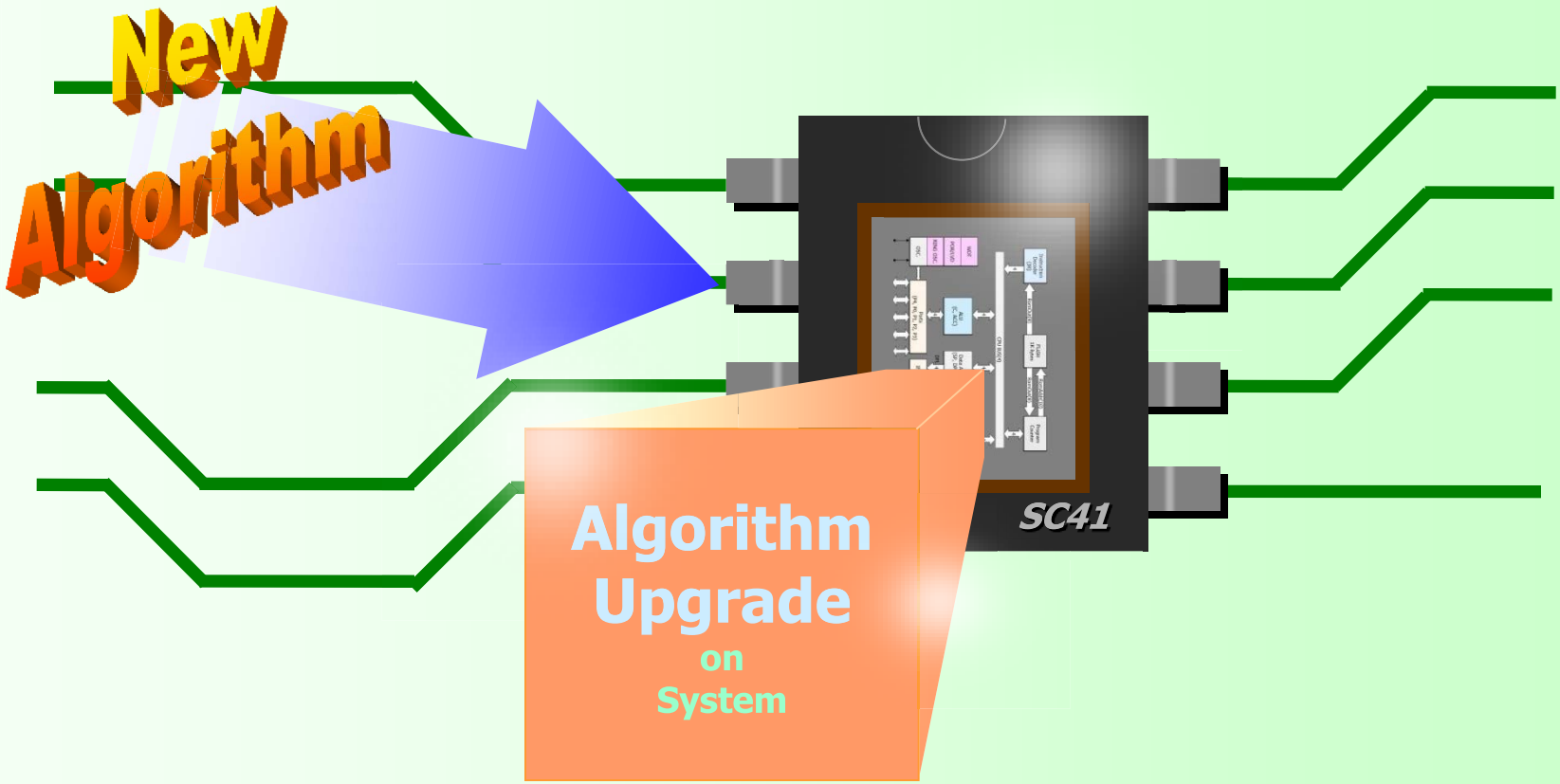
- **SC41 stores a security algorithm as extremely small electric charges.**



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

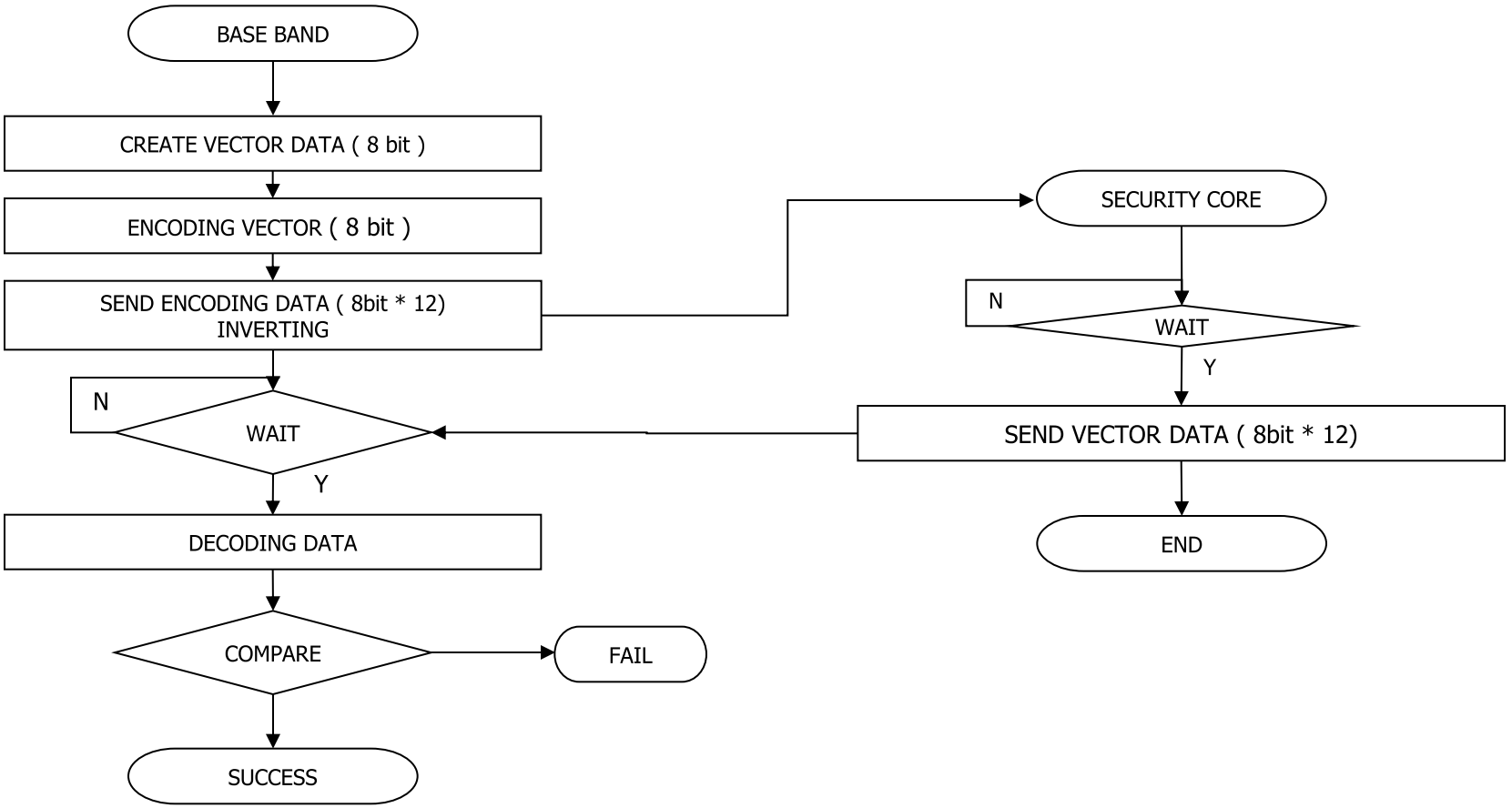
8. Strong Point of CORERIVER SC41 (2/2)

◆ **Upgrade function in the field.**

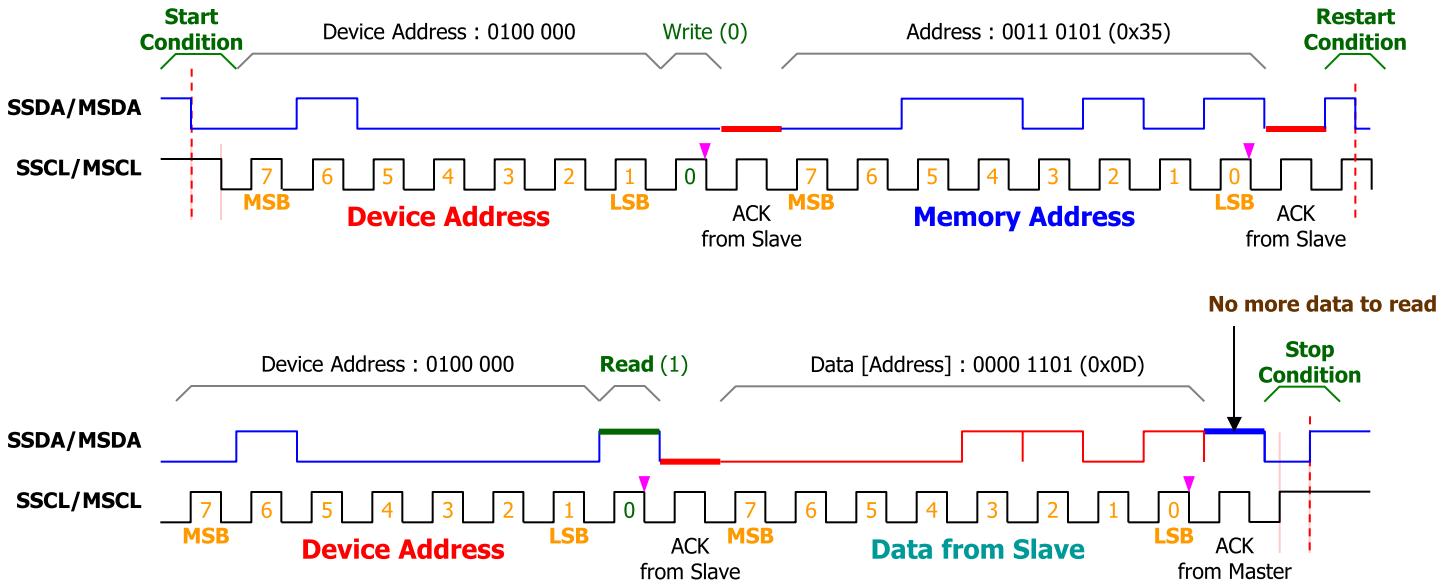


- ✓ CORERIVER SC41 can upgrade the security algorithm on a used system.
- ✓ To prevent the security algorithm from being cracked, you can replace it by a new one.

9. Security Flow

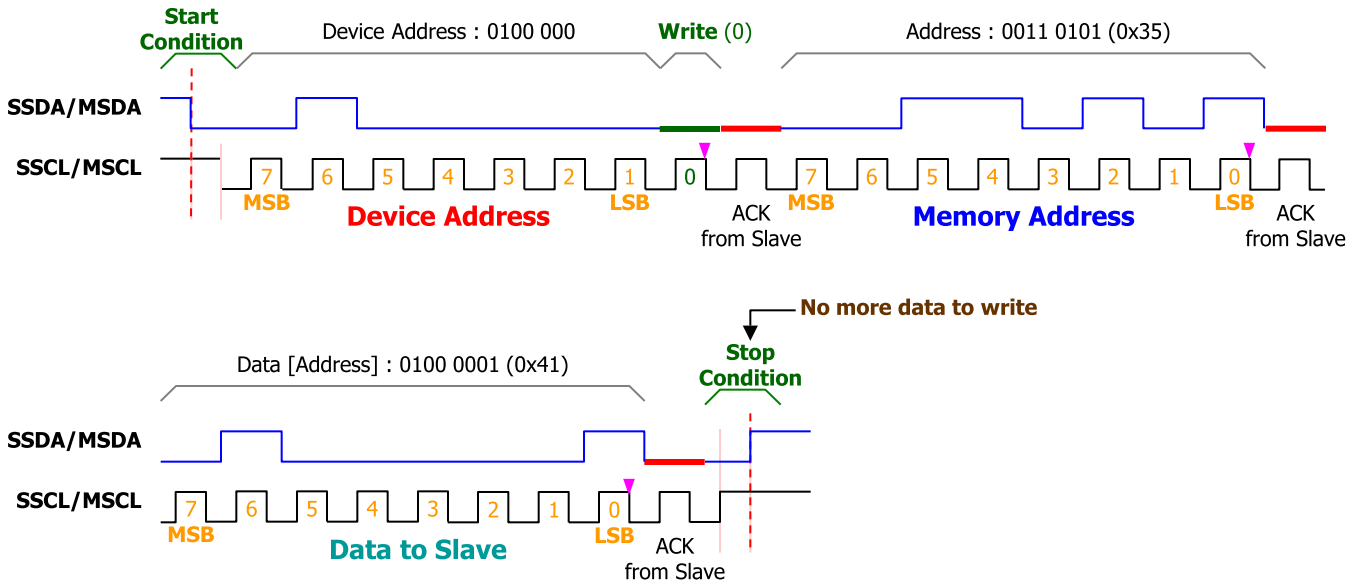


- Single Byte Read with Memory Address



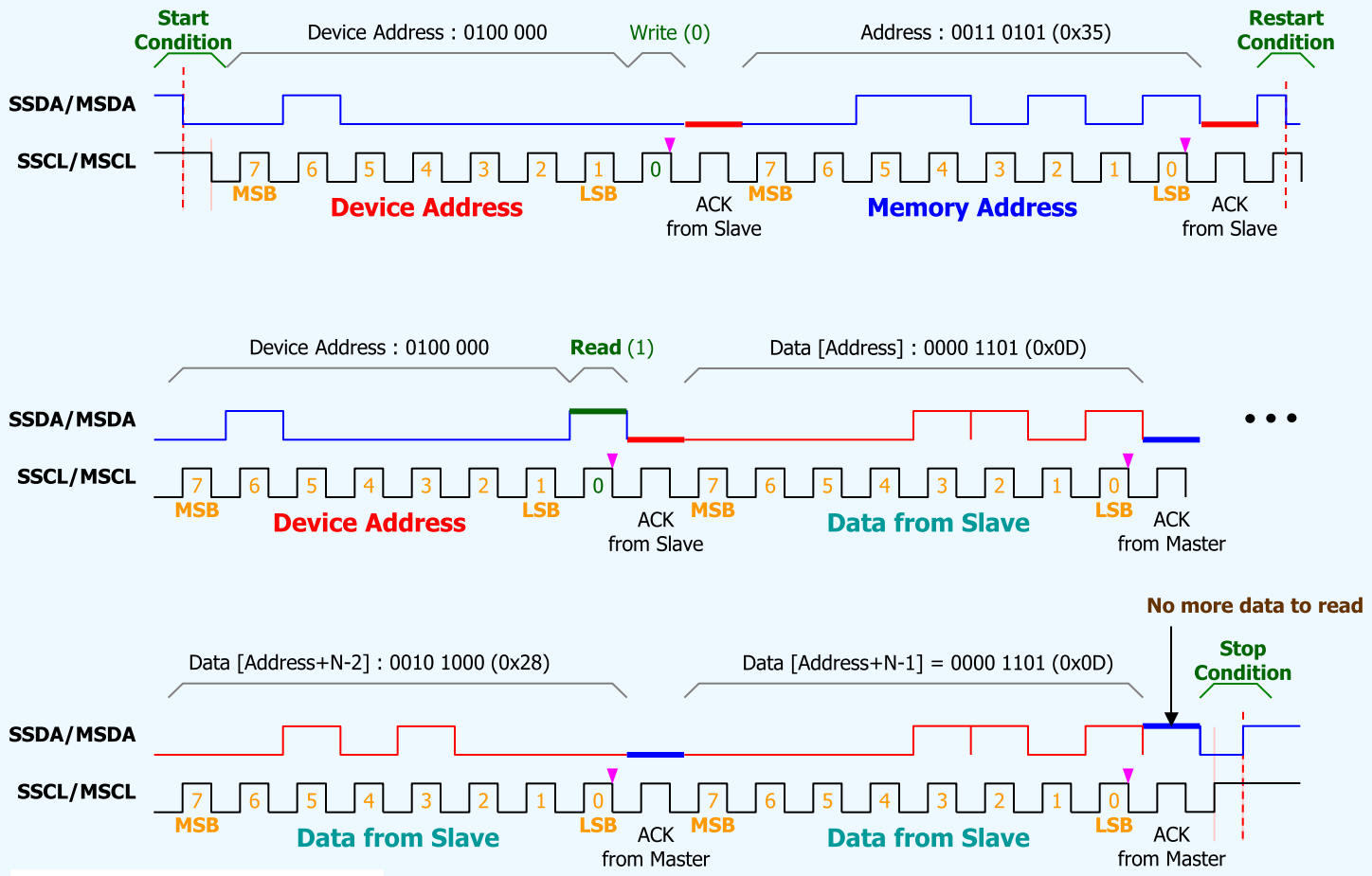
10.2 I2C Interface : 10-bit Addressing (Slave)

- Single Byte Write with Memory Address



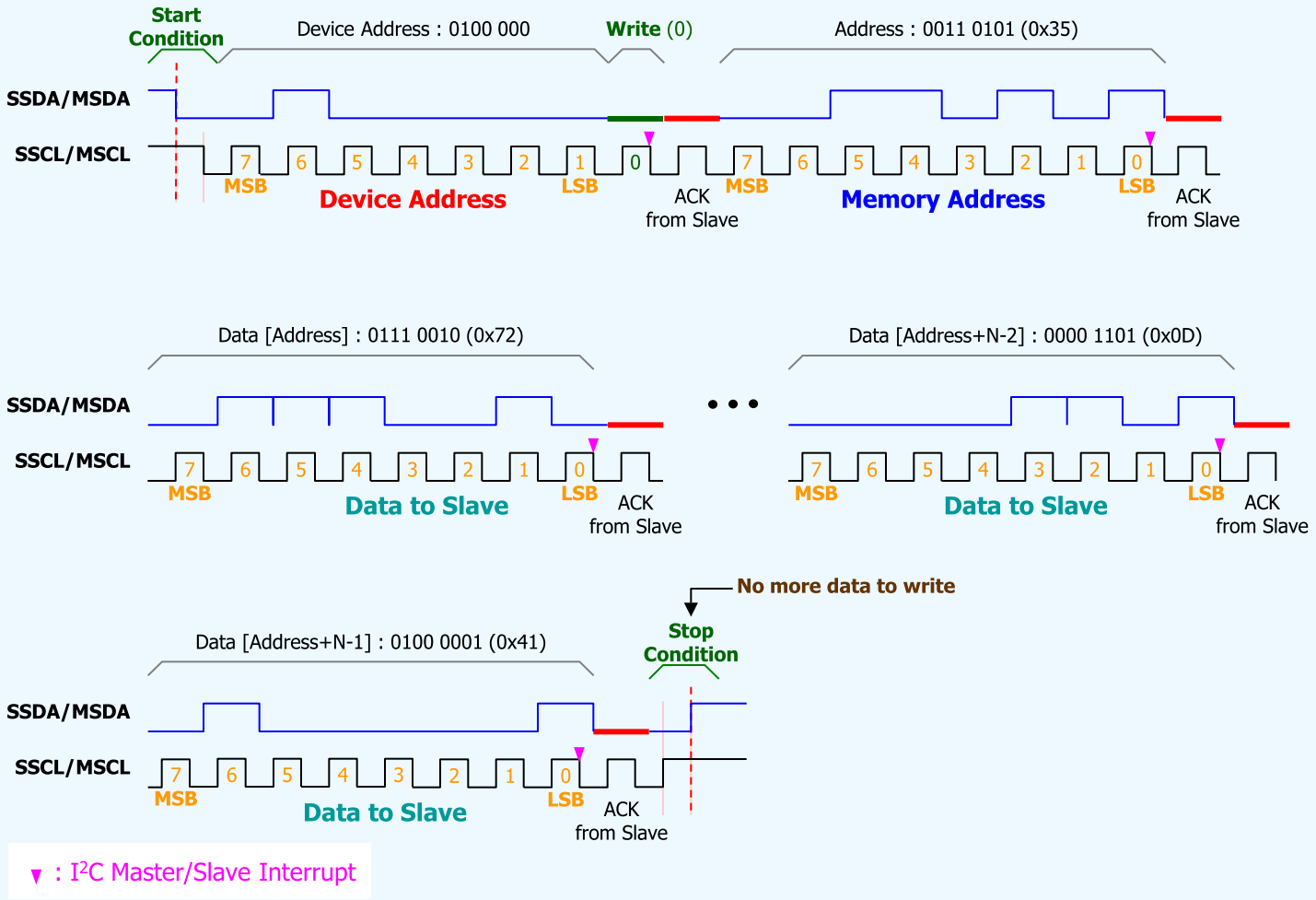
10.3 I2C Interface : 10-bit Addressing (Slave)

- Multi (N) Bytes Read with Memory Address



10.4 I2C Interface : 10-bit Addressing (Slave)

- Multi (N) Bytes Write with Memory Address



10.5 I2C Interface : Processing Time

◆ I2C Interface - Delay

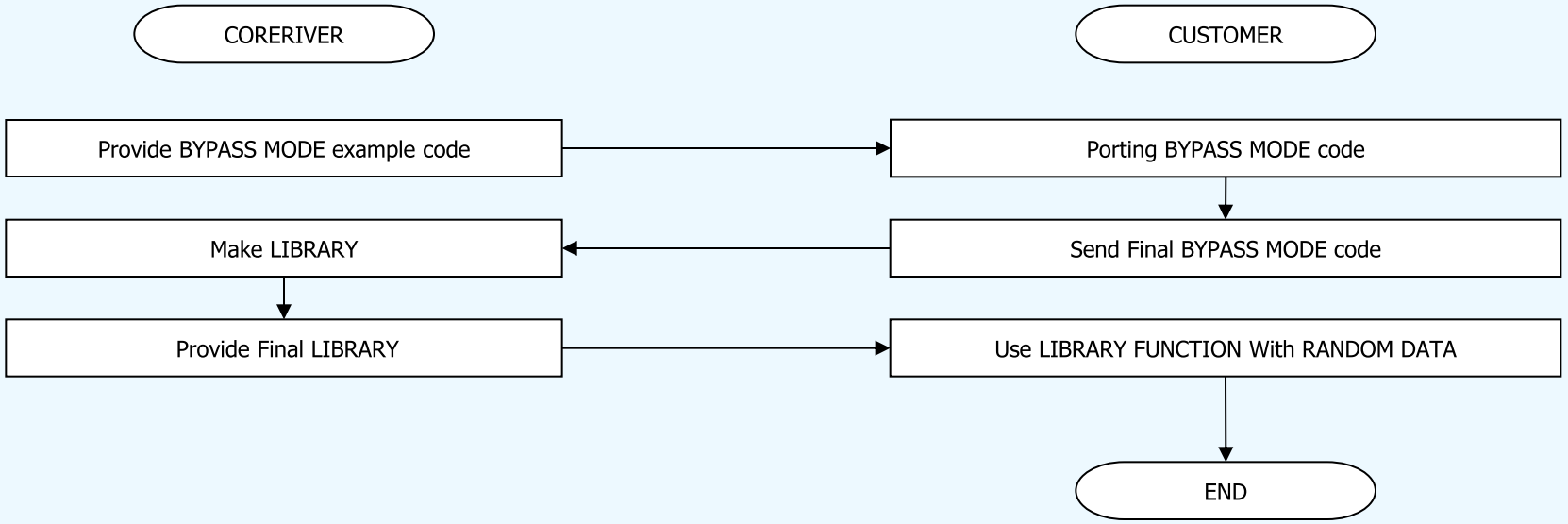
No	Process	Time
1	Chip Address ~ Data Byte Delay	20us
2	Data Byte ~ Data Byte Delay	20us
3	Writing ~ Read Delay (Algorithm processing time)	100ms

11. I2C Speed

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

*** Recommended I2C Speed : 30KHz ~ 100KHz.**

12. How to support Library



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

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

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

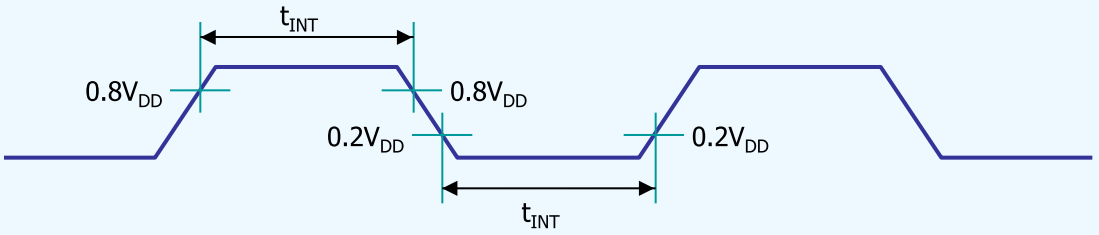
Parameter	Symbol	Pin	Conditions	Value			Unit
				Min.	Typ.	Max.	
Input Low Voltage	V_{IL}	BDATA	V_{DD} = 2.7V~5.5V	-0.5	-	$0.2V_{DD}$-0.1	V
Input high Voltage	V_{IH}	BDATA	V_{DD} = 2.7V~5.5V	$0.2V_{DD}$+1.0	-	V_{DD}+0.5	V
Output Low Voltage	V_{OL1}	BDATA	I_{OL} = 20mA @V_{DD}=5V (I_{OL} = 5mA @V_{DD}=2.6V)	-	-	$0.3V_{DD}$	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

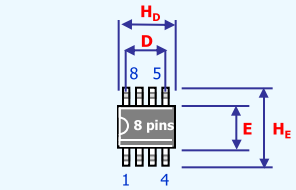
*** TA = -40 °C ~ +85 °C unless otherwise specified.**

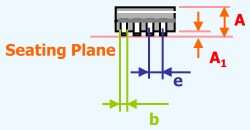
Parameter	Symbol	Pin	Conditions	Value			Unit
				Min.	Typ.	Max.	
Operating Frequency	F_{sys}	XTAL2	V_{DD} = 5V ± 10%	1	-	24	MHz
			V_{DD} = 3V ± 10%	1	-	12	
External Interrupt Input Width	t_{INT}	External Interrupt	V_{DD} = 5V ± 10%	4	-	-	F_{OSC}
			V_{DD} = 3V ± 10%	4	-	-	

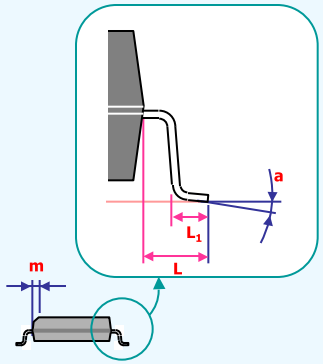
External Interrupt Pin



16. Package Dimensions : 8-SOIC







[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_D	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	-	8^8	0^8	-	8^8
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