瀚海微
HAN HAI WEI

# SD NAND SPECIFICATION

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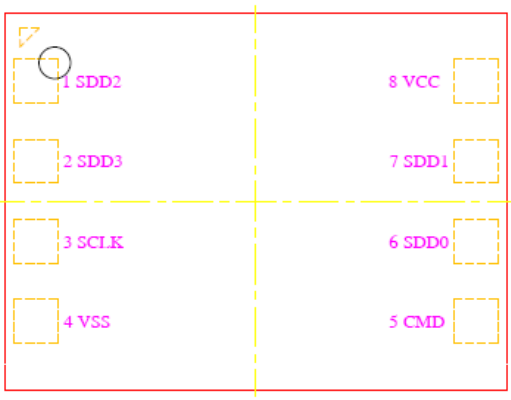
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# 1. Overview

## 1.1 Product Description

## 1.2 Features Summary

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| Name | |
|---|---|
| | |

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# 3. Product List

| Product model | Capacity | Actual Size | Sequential R / W | Package |
|---|---|---|---|---|
| HHW64GS90I-D1 | | | | |
| HHW128GS90I-D1 | | | | |

Table 2: Product List

# 4. Current Consumption

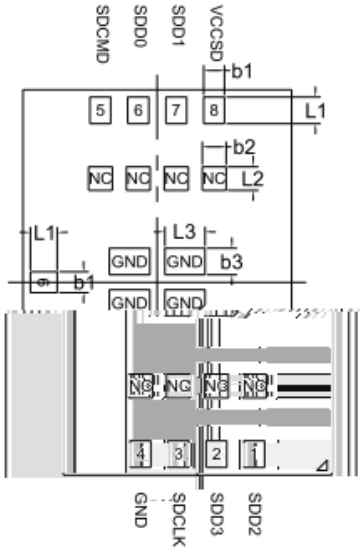
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# 5. Operational Environment

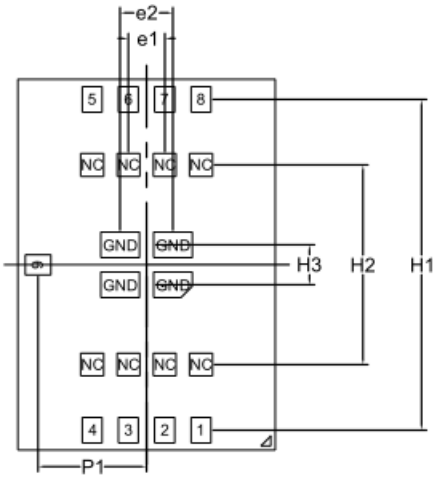
| Parameter | Range | |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Table 3: Operational Environment

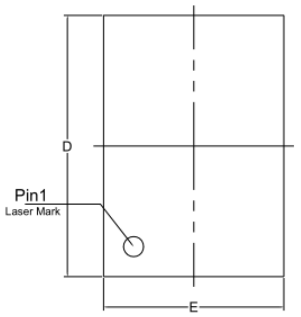
# 6. Physical Dimension



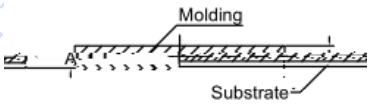

Bottom View




Bottom View




TOP View




Side View

| SYMBOL | DIMENSION IN MM | | | DIMENSION IN MIL | | | |
|---|---|---|---|---|---|---|---|
| | Min. | Nor. | Max. | Min. | Nor. | Max. | |
| D | 12.90 | 13.00 | 13.10 | 507.87 | 511.81 | 515.75 | |
| E | 8.90 | 9.00 | 9.10 | 350.39 | 354.33 | 358.27 | |
| 0.65 | 0.70 | 0.75 | 25.59 | 27.56 | 29.53 | | b1 |
| 0.75 | 0.80 | 0.85 | 29.53 | 31.50 | 33.46 | | b2 |
| 0.85 | 0.90 | 0.95 | 33.46 | 35.43 | 37.40 | | b3 |
| 0.85 | 0.90 | 0.95 | 33.46 | 35.43 | 37.40 | | L1 |
| 0.75 | 0.80 | 0.85 | 29.53 | 31.50 | 33.46 | | L2 |
| | | 1.85 Typ. | | | 72.84 Typ. | | e2 |
| | 149.61 Typ. | | | P1 | | 3.80 Typ. | |
| | 6.85 Typ. | | | 269.68 Typ. | | | H2 |
| | 1.40 Typ. | | | 55.12 Typ. | | | H3 |
| 75 | 0.80 | 0.85 | 29.53 | 31.50 | 33.46 | | A |

# 7. Recommended Schematic

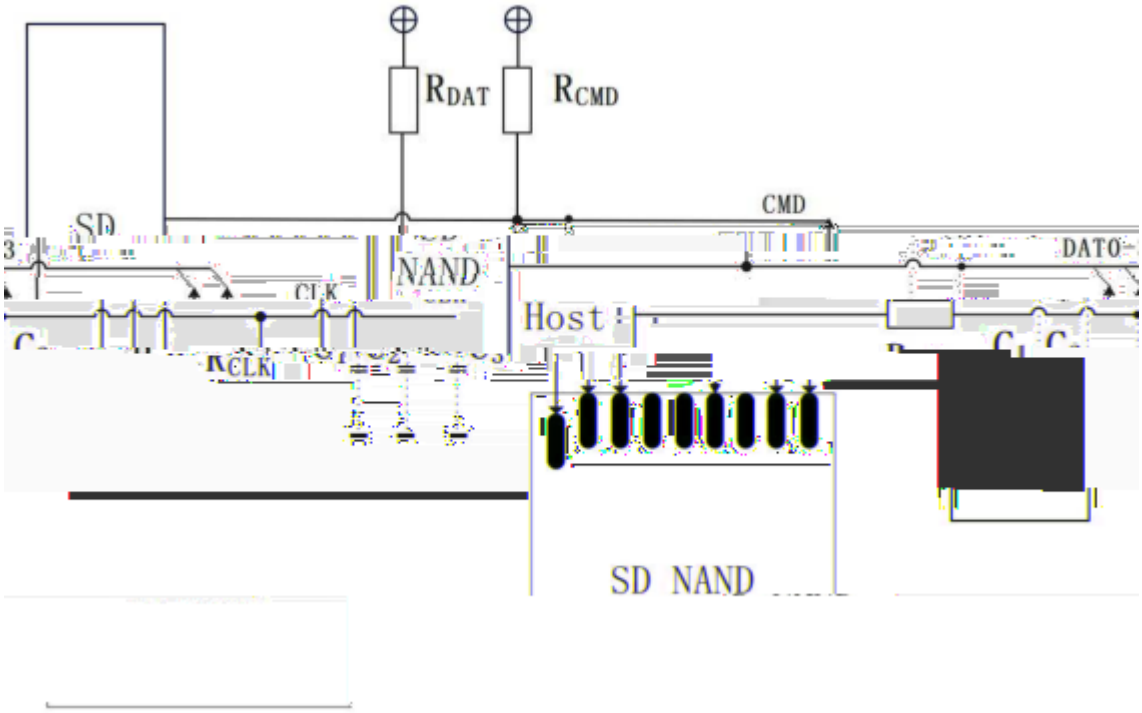



**Figure 4: Recommended Schemati**

**Note:**

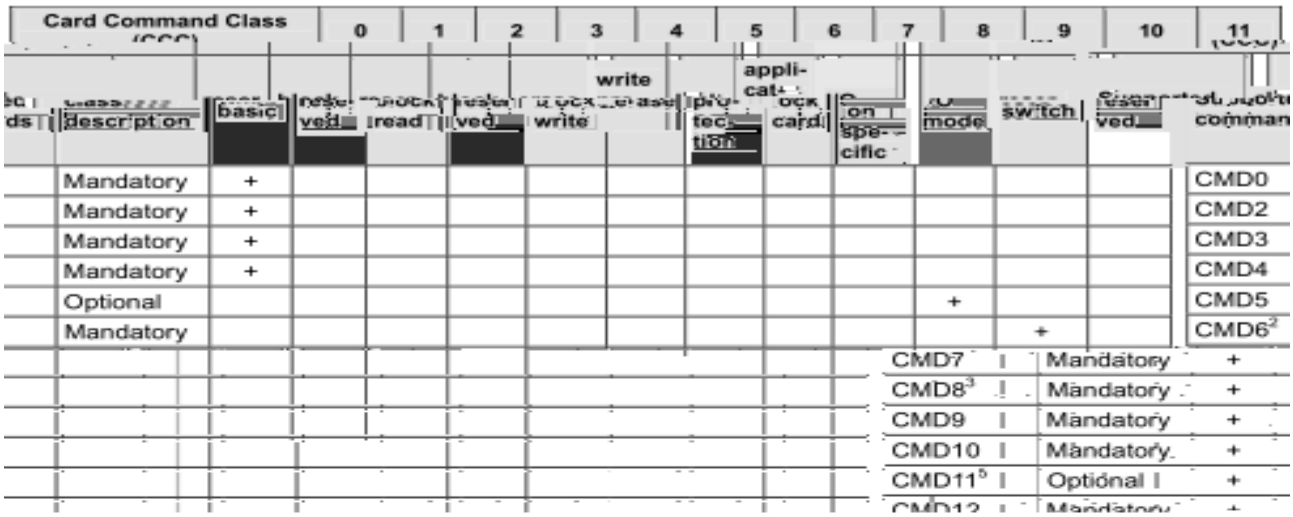
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# 8. Commands

### Command Types

,

,



| Card Command Class | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| description | basic | read | write | | | | | | | | | |
| Mandatory | + | | | | | | | | | | | CMD0 |
| Mandatory | + | | | | | | | | | | | CMD2 |
| Mandatory | + | | | | | | | | | | | CMD3 |
| Mandatory | + | | | | | | | | | | | CMD4 |
| Optional | | | | | | | | | + | | | CMD5 |
| Mandatory | | | | | | | | | | + | | CMD6[2] |
| | | | | | | | | | | | | CMD7 |
| | | | | | | | | | | | | CMD8[3] |
| | | | | | | | | | | | | CMD9 |
| | | | | | | | | | | | | CMD10 |
| | | | | | | | | | | | | CMD11[5] |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CMD56 | Mandatory | | | | | | | | | + | | | |
| CMD57[2] | Optional | | | | | | | | | | | + | |
| ACMD6 | Mandatory | | | | | | | | | + | | | |
| ACMD13 | Mandatory | | | | | | | | | + | | | |

# 9. Write Performance

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# 10. Read Performance

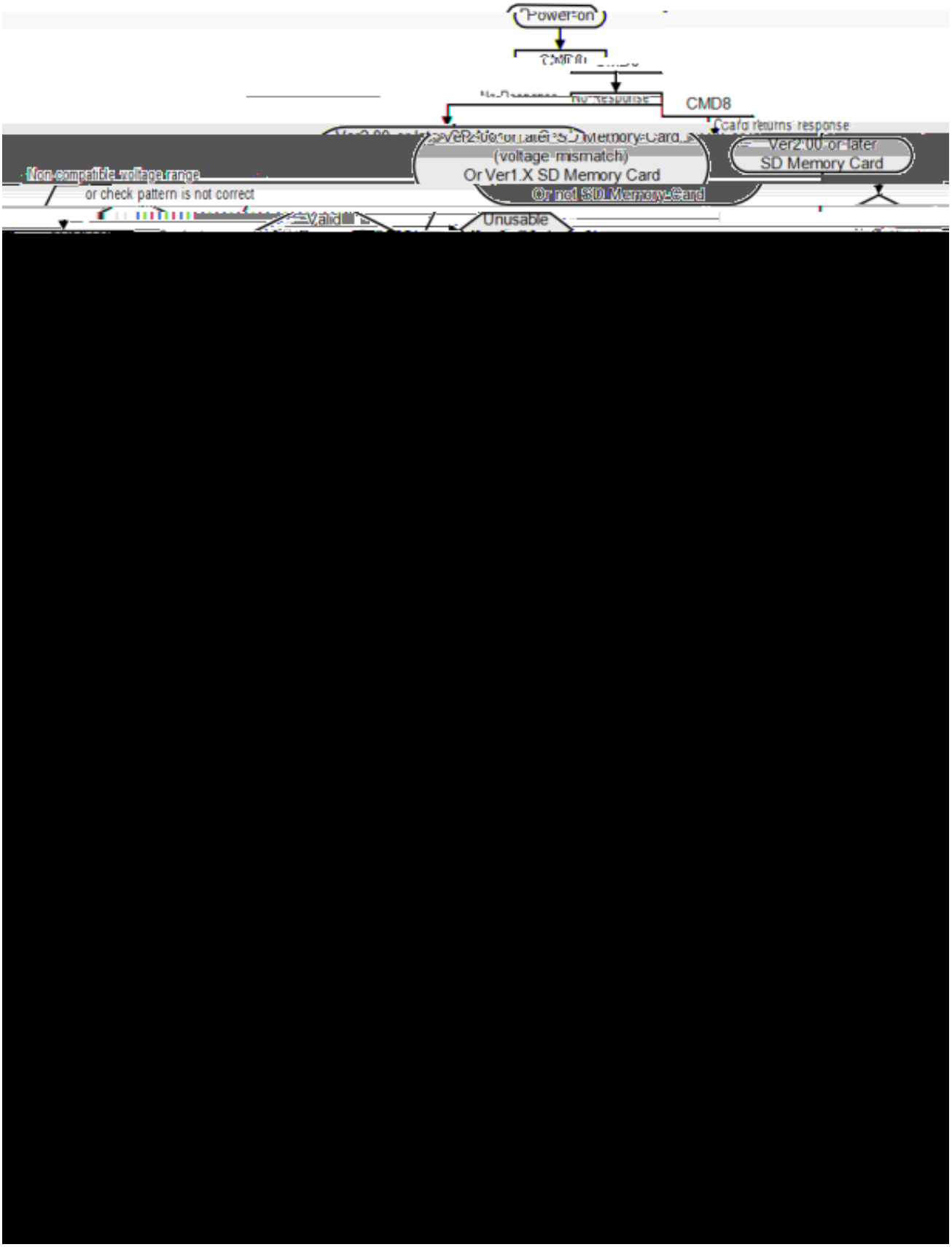
(1) Read Performance of Stream Data

# 11. SPI Mode

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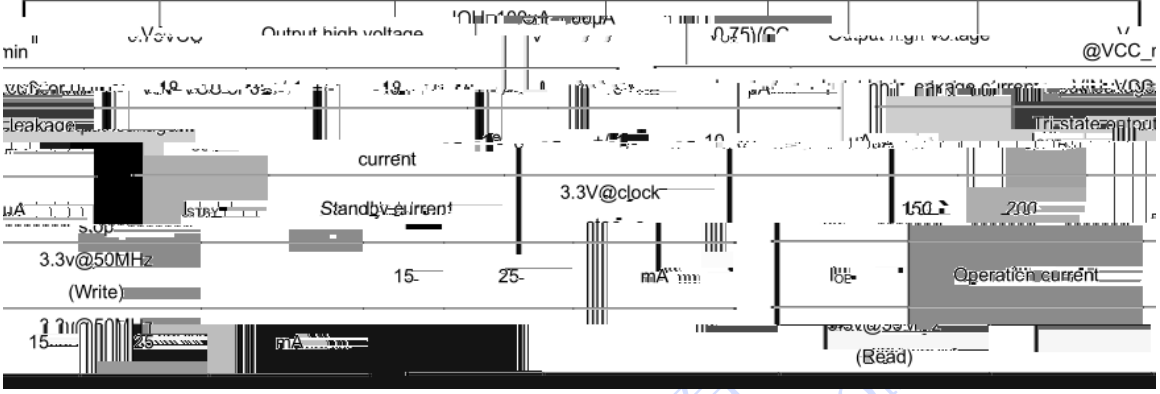
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## 12. SD Mode

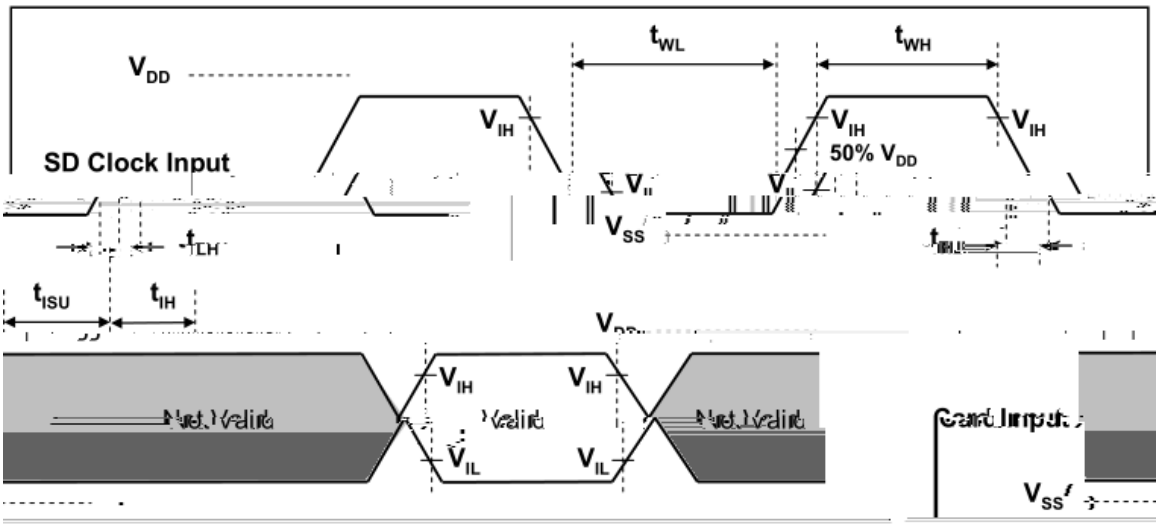

Power on
CMD8
Ver2.00 or later SD Memory Card
(voltage mismatch)
Or Ver1.X SD Memory Card
Or not SD Memory Card
Ver2.00 or later
SD Memory Card
Non compatible voltage range
or check pattern is not correct
Valid
Unusable

## 13. DC Characteristics

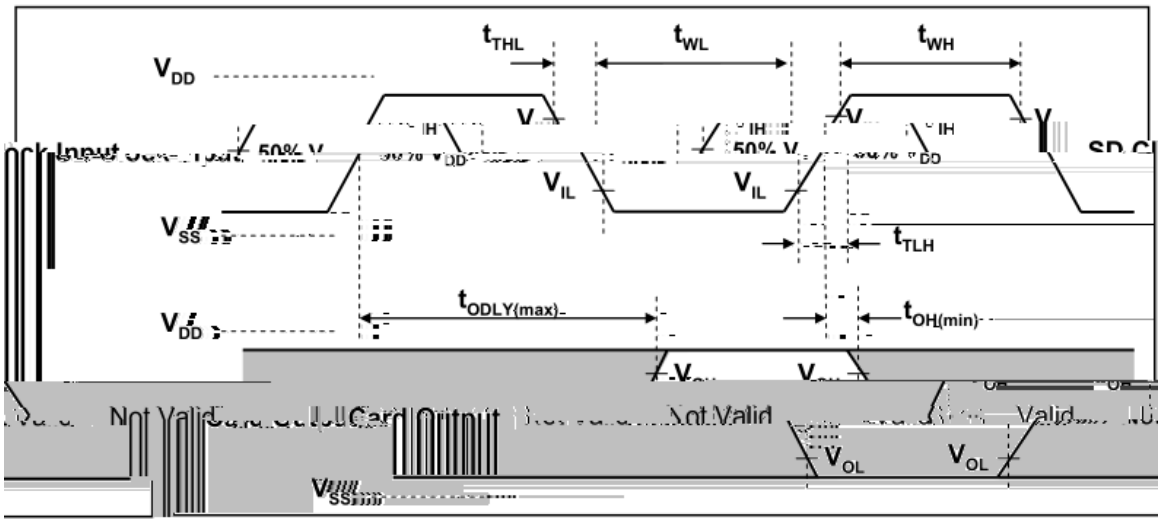
| Symbol | PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| $V_{IL}$ | Input low voltage | | VSS-0.3 | | 0.25VCC | V |
| $V_{IH}$ | Input high voltage | | 0.625VCC | | VCC+0.3 | V |
| $V_{OL}$ | Output low voltage | IOL=100μA @VCC_min | | | 0.125VCC | V |




## 14. Bus Timing (High-Speed Mode)

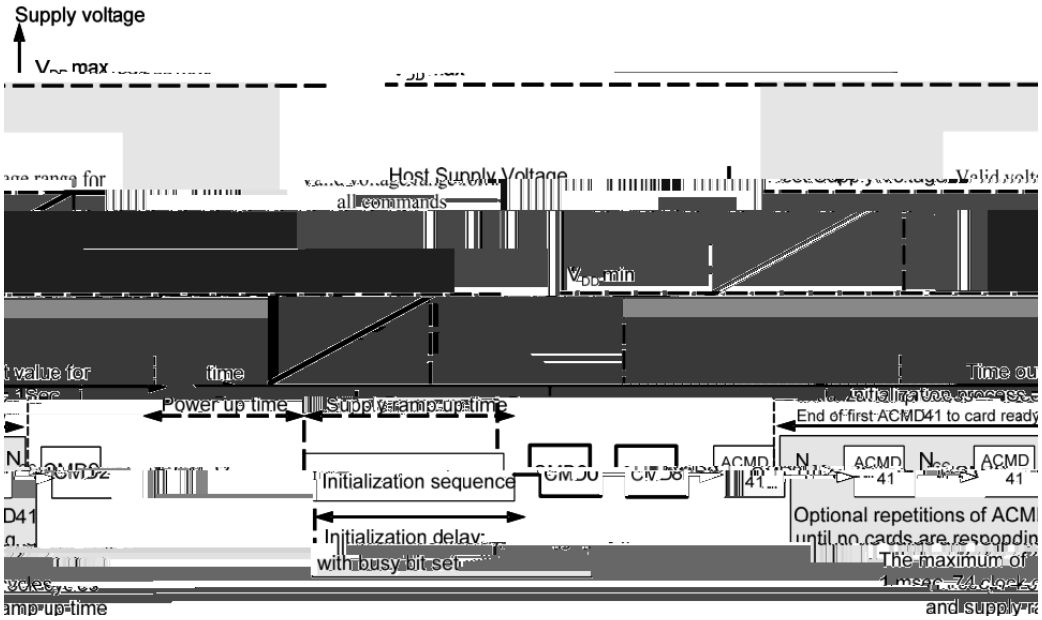



Card Input Timing (High Speed Card)




**Card Output Timing (High Speed Mode)**

## 15. Power Up



## Power-up Diagram

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