

GENERAL DESCRIPTION

The SGM4565 is a SIM card interface level translator between host controller and SIM card. It provides the high-speed level shifting function between host's 1.08V to 1.98V logic level and SIM card's 1.62V to 3.6V logic level. The signals include Data, CLK and Reset.

The SGM4565 is available in Green UTQFN-1.8×1.4-10L and WLCSP-1.06×1.06-9B packages.

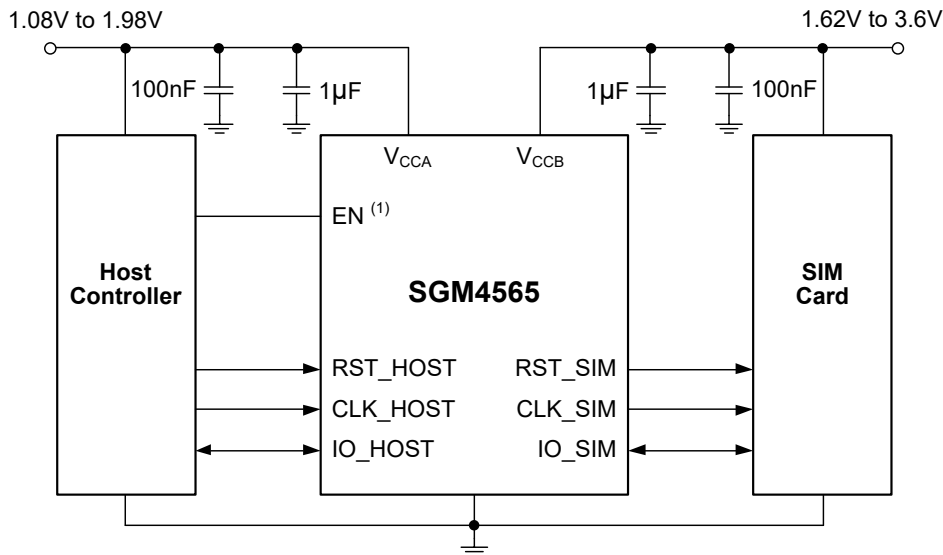
APPLICATIONS

- Smart Phone
- SIM Card Terminals
- POS Machine

FEATURES

- Support 1.62V to 3.6V SIM Card Supply Voltage
- Support 1.08V to 1.98V Host Microcontroller Supply Voltage
- Support up to 10MHz Clock Frequency
- Automatic Level Translation of Data, Reset and CLK Signals between Host and SIM Card
- Support Automatic Enable and Disable by V_{CCB}
- Integrated Pull-Up and Pull-Down Resistors
- Integrated EMI Filters
- Available in Green UTQFN-1.8×1.4-10L and WLCSP-1.06×1.06-9B Packages

TYPICAL APPLICATION



NOTE:
1. Only for UTQFN package.

Figure 1. Typical Application Circuit

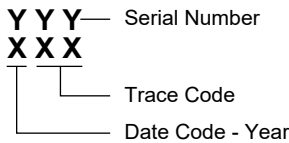
PACKAGE/ORDERING INFORMATION

| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|---------|---------------------|-----------------------------|-------------------|-----------------|---------------------|
| SGM4565 | UTQFN-1.8×1.4-10L | -40°C to +125°C | SGM4565XUWQ10G/TR | 07F XXX | Tape and Reel, 3000 |
| | WLCSP-1.06×1.06-9B | -40°C to +125°C | SGM4565XG/TR | XXXX 4565 | Tape and Reel, 4000 |

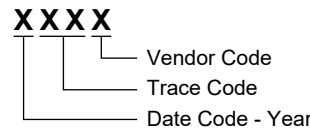
MARKING INFORMATION

NOTE: XXX = Date Code and Trace Code. XXXX = Date Code, Trace Code and Vendor Code.

UTQFN-1.8×1.4-10L



WLCSP-1.06×1.06-9B



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage Range

Host Supply, V_{CCA} -0.5V to 4.6V

SIM Supply, V_{CCB} -0.5V to 4.6V

Input/Output Voltage Range (Host Side)

CLK_HOST, $V_{I(CLK_HOST)}$... -0.5V to MIN (4.6V, $V_{CCA} + 0.3V$)

RST_HOST, $V_{I(RST_HOST)}$... -0.5V to MIN (4.6V, $V_{CCA} + 0.3V$)

IO_HOST, $V_{I(IO_HOST)}$ -0.5V to MIN (4.6V, $V_{CCA} + 0.3V$)

EN, $V_{I(EN)}$ -0.5V to 4.6V

Input/Output Voltage Range (SIM Side)

CLK_SIM, $V_{I(CLK_SIM)}$ -0.5V to MIN (4.6V, $V_{CCB} + 0.3V$)

RST_SIM, $V_{I(RST_SIM)}$ -0.5V to MIN (4.6V, $V_{CCB} + 0.3V$)

IO_SIM, $V_{I(IO_SIM)}$ -0.5V to MIN (4.6V, $V_{CCB} + 0.3V$)

Package Thermal Resistance

UTQFN-1.8×1.4-10L, θ_{JA} 286.2°C/W

UTQFN-1.8×1.4-10L, θ_{JB} 147.6°C/W

UTQFN-1.8×1.4-10L, θ_{JC} 179°C/W

WLCSP-1.06×1.06-9B, θ_{JA} 115°C/W

WLCSP-1.06×1.06-9B, θ_{JB} 34.8°C/W

WLCSP-1.06×1.06-9B, θ_{JC} 50.8°C/W

Junction Temperature +150°C

Storage Temperature Range -65°C to +150°C

Lead Temperature (Soldering, 10s) +260°C

ESD Susceptibility ^{(1) (2)}

HBM ±8000V

CDM ±1000V

NOTES:

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range

Host Supply, V_{CCA} 1.08V to 1.98V

SIM Supply, V_{CCB} 1.62V to 3.6V

Input/Output Voltage Range (Host Side)

CLK_HOST, $V_{I(CLK_HOST)}$ 0V to V_{CCA}

RST_HOST, $V_{I(RST_HOST)}$ 0V to V_{CCA}

IO_HOST, $V_{I(IO_HOST)}$ 0V to V_{CCA}

EN, $V_{I(EN)}$ 0V to 3.6V

Input/Output Voltage Range (SIM Side)

CLK_SIM, $V_{I(CLK_SIM)}$ 0V to V_{CCB}

RST_SIM, $V_{I(RST_SIM)}$ 0V to V_{CCB}

IO_SIM, $V_{I(IO_SIM)}$ 0V to V_{CCB}

Operating Temperature Range -40°C to +125°C

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

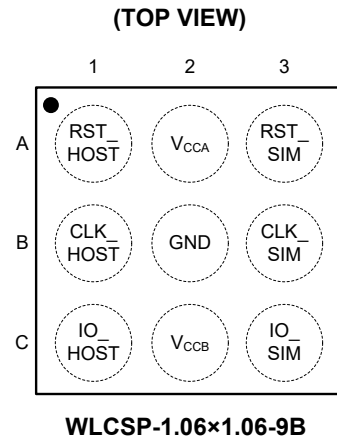
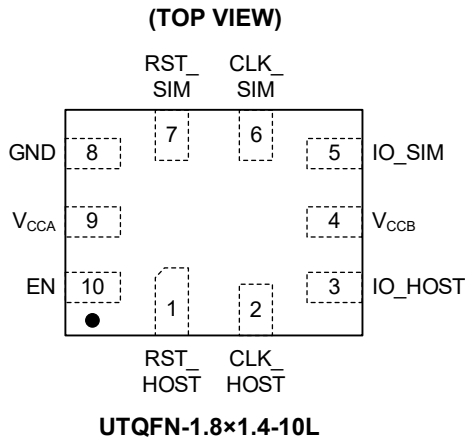
ESD SENSITIVITY CAUTION

This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATIONS



PIN DESCRIPTION

| PIN | | NAME | TYPE | FUNCTION |
|-------------------|--------------------|----------|------|---|
| UTQFN-1.8×1.4-10L | WLCSP-1.06×1.06-9B | | | |
| 1 | A1 | RST_HOST | I | Host Controller Reset Input Pin. |
| 2 | B1 | CLK_HOST | I | Host Controller Clock Input Pin. |
| 3 | C1 | IO_HOST | I/O | Host Side Bidirectional Data Input/Output Pin. The output of the host must be on an open-drain driver. |
| 4 | C2 | V_CCB | P | SIM Card Supply Voltage. When $V_{CCB} < V_{CCB_DIS}$, the chip is disabled. 100nF and 1μF ceramic capacitors should be placed as close as possible to V_CCB pin. |
| 5 | C3 | IO_SIM | I/O | SIM Card Side Bidirectional Data Input/Output Pin. The output of the SIM card must be on an open-drain driver. |
| 6 | B3 | CLK_SIM | O | SIM Card Clock Output Pin. |
| 7 | A3 | RST_SIM | O | SIM Card Reset Output Pin. |
| 8 | B2 | GND | G | Ground. |
| 9 | A2 | V_CCA | P | Host Controller Supply Voltage for the Input/Output Pins (CLK_HOST, RST_HOST, IO_HOST, EN). 100nF and 1μF ceramic capacitors should be placed as close as possible to V_CCA pin. |
| 10 | — | EN | I | Host Controller Driven Enable Pin. A logic low reduces the supply current. Connect to V_CCA for normal operation. (Only for UTQFN package, while for WLCSP package, the EN pin is connected internally to V_CCA.) |

NOTE: I = input, O = output, I/O = input/output, P = power, G = ground.

FUNCTIONAL DESCRIPTION

Table 1. Function Table

| Supply Voltage | | Input | Input/Output | | Operational Mode |
|------------------|------------------|-------------------|--------------------------|-----------------|------------------|
| V _{CCA} | V _{CCB} | EN ⁽¹⁾ | Host | SIM Card | |
| 1.08V to 1.98V | 1.62V to 3.6V | H | Host = SIM Card | SIM Card = Host | Active |
| 1.08V to 1.98V | 1.62V to 3.6V | L | Condition D, See Table 2 | | Shutdown Mode |
| GND | 1.62V to 3.6V | X | Condition A, See Table 2 | | Shutdown Mode |
| 1.08V to 1.98V | GND | X | Condition B, See Table 2 | | Shutdown Mode |
| GND | GND | X | Condition C, See Table 2 | | Shutdown Mode |

NOTE:

1. H = High-level voltage, L = Low-level voltage, X = Don't care.

Table 2. Pin Condition ⁽¹⁾

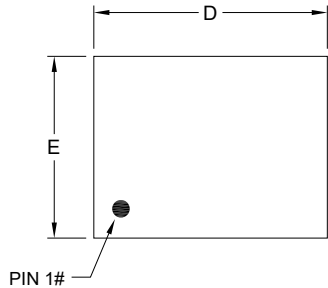
| Pin Name | Condition A ⁽²⁾ | Condition B ⁽³⁾ | Condition C | Condition D ⁽⁴⁾ |
|----------|------------------------------|------------------------------|------------------------------|------------------------------|
| RST_HOST | 100kΩ pull low | 100kΩ pull low | 100kΩ pull low | 100kΩ pull low |
| CLK_HOST | 100kΩ pull low | 100kΩ pull low | 100kΩ pull low | 100kΩ pull low |
| IO_HOST | 5kΩ pull to V _{CCA} | 5kΩ pull to V _{CCA} | 5kΩ pull to V _{CCA} | 5kΩ pull to V _{CCA} |
| RST_SIM | 580Ω pull low | 100kΩ pull low | 100kΩ pull low | 580Ω pull low |
| CLK_SIM | 580Ω pull low | 100kΩ pull low | 100kΩ pull low | 580Ω pull low |
| IO_SIM | 120Ω pull low | 120Ω pull low | Hi-Z | 70Ω pull low |

NOTES:

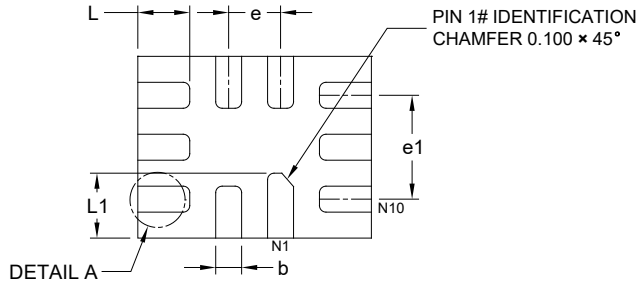
- See Figure 3.
- For condition A, 580Ω and 120Ω are the results corresponding to V_{CCA} = 0V and V_{CCB} = 3.6V.
- For condition B, 120Ω is the result corresponding to V_{CCA} = 1.98V and V_{CCB} = 0V.
- For condition D, 580Ω and 70Ω are the results corresponding to V_{CCA} = 1.98V and V_{CCB} = 3.6V. (Only for UTQFN package)

PACKAGE OUTLINE DIMENSIONS

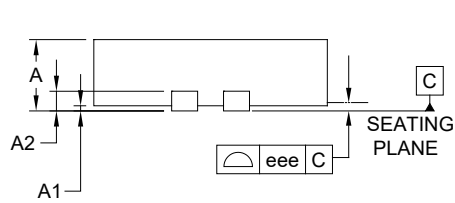
UTQFN-1.8×1.4-10L



TOP VIEW



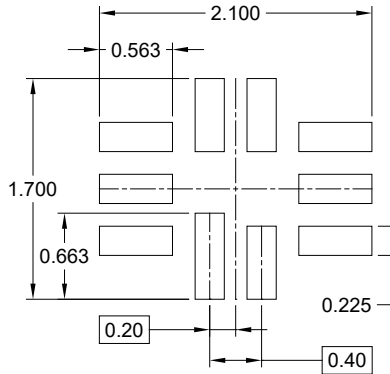
BOTTOM VIEW



SIDE VIEW



DETAIL A
ALTERNATE TERMINAL
CONSTRUCTION



RECOMMENDED LAND PATTERN (Unit: mm)

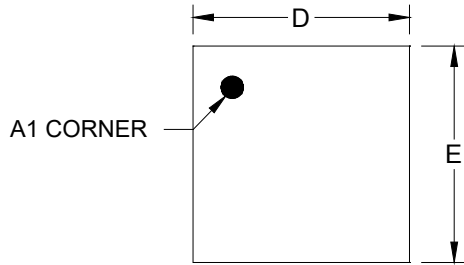
| Symbol | Dimensions In Millimeters | | |
|--------|---------------------------|-------|-------|
| | MIN | NOM | MAX |
| A | 0.450 | - | 0.600 |
| A1 | 0.000 | - | 0.050 |
| A2 | 0.152 REF | | |
| b | 0.150 | 0.200 | 0.250 |
| D | 1.750 | 1.800 | 1.850 |
| E | 1.350 | 1.400 | 1.450 |
| e | 0.400 TYP | | |
| e1 | 0.800 REF | | |
| L | 0.350 | 0.400 | 0.450 |
| L1 | 0.450 | 0.500 | 0.550 |
| L2 | 0.000 | - | 0.100 |
| eee | - | 0.080 | - |

NOTE: This drawing is subject to change without notice.

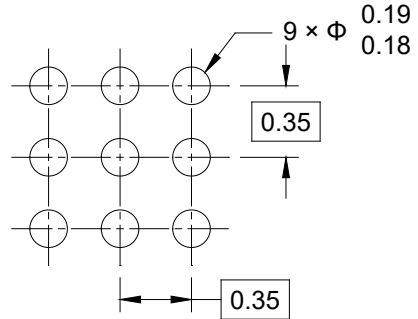
PACKAGE INFORMATION

PACKAGE OUTLINE DIMENSIONS

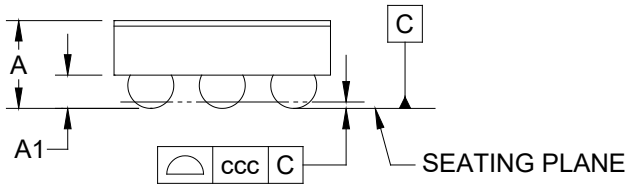
WLCSP-1.06×1.06-9B



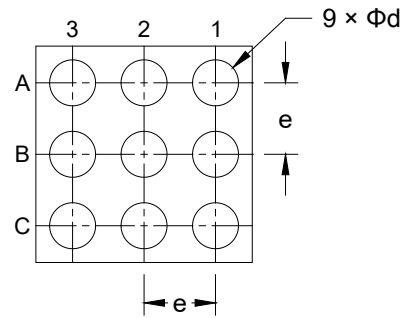
TOP VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



SIDE VIEW



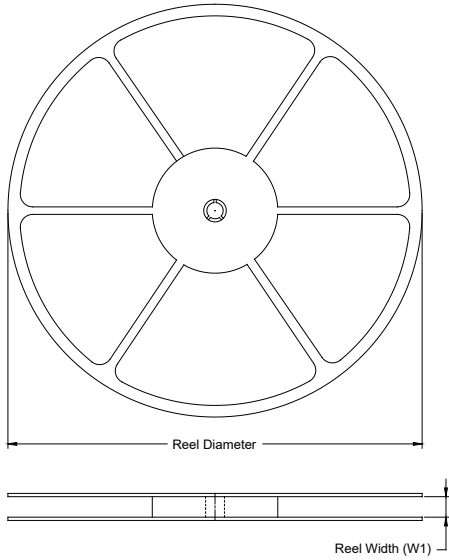
BOTTOM VIEW

| Symbol | Dimensions In Millimeters | | |
|--------|---------------------------|-----|-------|
| | MIN | NOM | MAX |
| A | - | - | 0.468 |
| A1 | 0.127 | - | 0.167 |
| D | 1.030 | - | 1.090 |
| E | 1.030 | - | 1.090 |
| d | 0.192 | - | 0.252 |
| e | 0.350 BSC | | |
| ccc | 0.050 | | |

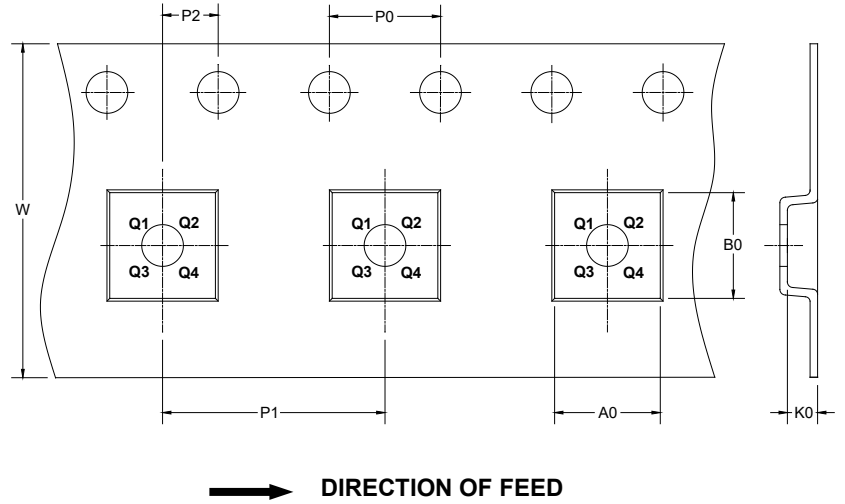
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

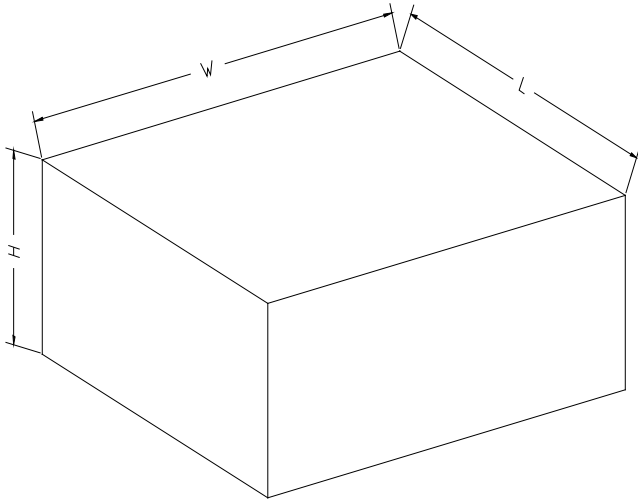
KEY PARAMETER LIST OF TAPE AND REEL

| Package Type | Reel Diameter | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P0 (mm) | P1 (mm) | P2 (mm) | W (mm) | Pin1 Quadrant |
|--------------------|---------------|--------------------|---------|---------|---------|---------|---------|---------|--------|---------------|
| UTQFN-1.8×1.4-10L | 7" | 9.0 | 1.75 | 2.10 | 0.70 | 4.0 | 4.0 | 2.0 | 8.0 | Q1 |
| WLCSP-1.06×1.06-9B | 7" | 9.0 | 1.18 | 1.18 | 0.57 | 4.0 | 4.0 | 2.0 | 8.0 | Q1 |

D200001

PACKAGE INFORMATION

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

| Reel Type | Length (mm) | Width (mm) | Height (mm) | Pizza/Carton |
|-------------|-------------|------------|-------------|--------------|
| 7" (Option) | 368 | 227 | 224 | 8 |
| 7" | 442 | 410 | 224 | 18 |

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