

BGSF110GN26

SP10T Antenna Switch Module with integrated GPIO controller, 2 GSM-TX and 8 TRX Ports for multi-mode GSM/EDGE, WCDMA or LTE applications

Preliminary Datasheet

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| Page | Subjects (major changes since last revision) |
|------|--|
| 12 | Electrical characteristics updated |
| 15 | Package outline drawing added |
| | |
| | |

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Last Trademarks Update 2011-11-11

1 Features

Main Features

- Suitable for multi-mode GSM / EDGE / C2K / WCDMA / LTE applications
- 0.1 to 3.8 GHz coverage
- Ultra-low insertion loss and harmonics generation
- Integrated GSM transmit filters
- 2 high-linearity GSM TX paths
- 8 high-linearity, interchangeable WCDMA TRX ports
- 2 TRX ports also function as high-linearity GSM RX ports
- High port-to-port isolation
- Integrated GPIO decoder supporting logic levels from 1.35 V to 3.1 V
- No decoupling DC capacitors required, if no DC applied on RF lines
- Small form factor 3.4 mm x 2.6 mm x 0.73 mm
- 1kV HBM ESD protection



Description

The BGSF110GN26 is a Single Pole Ten Throw (SP10T) Antenna Switch Module (ASM) optimized for wireless applications up to 3.8 GHz. It is a perfect solution for multi-mode handsets based on quadband GSM, WCDMA and LTE. The switch module configuration is shown in [Figure 1](#).

The module comes in a miniature TSNP package and comprises of a high power CMOS SP10T switch with integrated GPIO controller and harmonic filters for GSM high and low band transmit paths. The on-chip controller integrates CMOS logic and level shifters, driven by control inputs from 1.35 to 3.1 V.

No external DC blocking capacitors are required in typical applications as long as no DC is applied to any RF port.

| Product Name | Package | Marking |
|--------------|--------------|---------|
| BGSF110GN26 | PG-TSNP-26-2 | F10G |

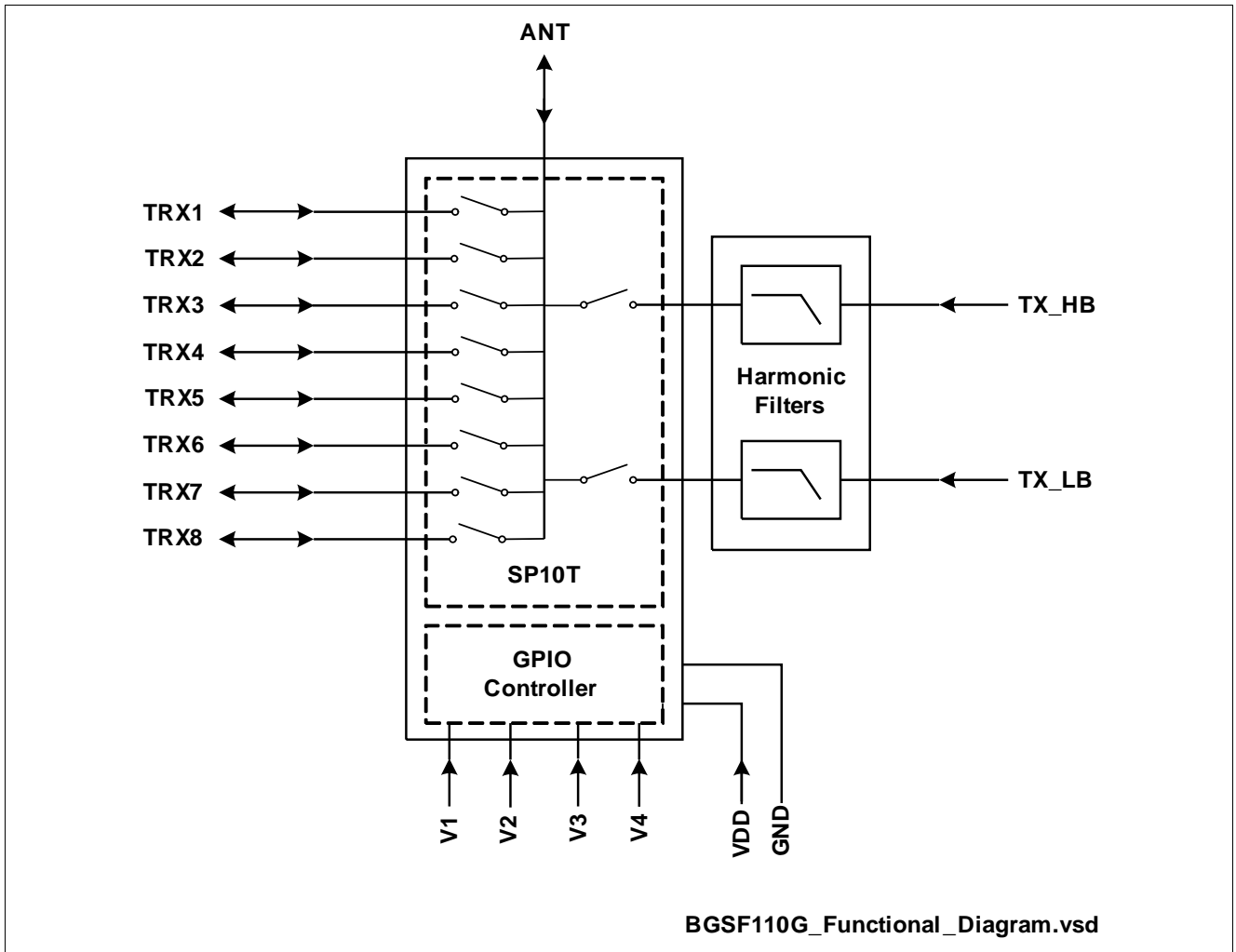


Figure 1 Functional diagram

2 Maximum Ratings

Table 1 Maximum Ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---------------|--------|------|--------------|------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Supply voltage | V_{dd} | -0.5 | – | 3.6 | V | – |
| GPIO control voltage levels | V_{CtrlX} | -0.7 | – | $V_{dd}+0.7$ | V | – |
| Maximum DC-voltage on RF-ports and RF-grounds | V_{RFDC} | 0 | – | 0 | V | – |
| Storage Temperature Range | T_{stg} | -65 | – | 150 | °C | – |
| Junction temperature | T_j | – | – | 125 | °C | – |
| Thermal resistance junction - soldering point | R_{thJS} | – | 32 | – | K/W | – |
| RF input power at all GSM TX ports | P_{RF_TX} | – | – | 36 | dBm | CW |
| RF input power at all TRX ports | P_{RF_TRX} | – | – | 30 | dBm | CW |

Table 2 ESD Ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|----------------|--------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| ESD capability Human Body Model | V_{ESD_HBM} | – | 1000 | – | V | – |
| ESD capability ANT port (according IEC 6100-4-2 contact) | V_{ESD_ANT} | – | tbd | – | V | Using external shunt inductor on ANT port |

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

3 Operation Ranges

Table 3 Operation Ranges

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|----------------------------|-------------------|--------|------|----------|--------------|-----------------------|
| | | Min. | Typ. | Max. | | |
| Supply Voltage | V_{dd} | 2.4 | 3.0 | 3.3 | V | – |
| Supply current | I_{dd} | – | 100 | 200 | μ A | – |
| Ambient temperature range | T_A | -30 | – | +85 | $^{\circ}$ C | – |
| Extended temperature range | T_E | -40 | – | +95 | $^{\circ}$ C | Functional only |
| Control voltage High | V_{CtrlH} | 1.35 | 1.8 | V_{dd} | V | – |
| Control voltage Low | V_{CtrlL} | 0 | – | 0.45 | V | – |
| Input Power | | | | | | |
| TRX ports | P_{in_TRX} | – | – | 27 | dBm | – |
| GSM TX LB port | $P_{in_GSM_LB}$ | – | – | 36 | dBm | 50% duty cycle |
| GSM TX HB port | $P_{in_GSM_HB}$ | – | – | 34 | dBm | 50% duty cycle |

4 Electrical Characteristics

Terminating port impedance: $Z_0 = 50 \Omega$

Temperature: $T = -25 \text{ }^\circ\text{C} - +85 \text{ }^\circ\text{C}$

Supply voltage: $V_{dd} = 2.4 \text{ V}.. 3.3 \text{ V}$

Unless otherwise specified

Table 4 RF Characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|--------------|--------|------|------|---------------|---|
| | | Min. | Typ. | Max. | | |
| Insertion Loss | | | | | | |
| TRX1-8 | IL | – | 0.50 | 0.70 | dB | 698 to 960 MHz |
| | | – | 0.58 | 0.78 | dB | 1428 to 1990 MHz |
| | | – | 0.62 | 0.82 | dB | 1990 to 2170 MHz |
| | | – | 0.75 | 1.00 | dB | 2170 to 2690 MHz |
| | | – | 1.12 | 1.42 | dB | 2690 to 3500 MHz |
| | | – | 1.35 | 1.63 | dB | 3600 to 3800 MHz |
| TXLB | IL | – | 0.90 | 1.20 | dB | 824 to 915 MHz |
| TXHB | IL | – | 1.00 | 1.30 | dB | 1710 to 1910 MHz |
| Return Loss | | | | | | |
| | RL | 25 | 30 | – | dB | 698 to 960 MHz |
| | | 23 | 27 | – | dB | 1710 to 1990 MHz |
| | | 21 | 25 | – | dB | 1990 to 2170 MHz |
| | | 18 | 23 | – | dB | 2170 to 2690 MHz |
| | | 13 | 16 | – | dB | 2690 to 3500 MHz |
| Isolation (f = 698-2690 MHz unless noted otherwise) | | | | | | |
| | ISO | 32 | 40 | – | dB | TRX1,2,3,7,8 to TRX4,5,6 (f = 698 - 2400 MHz) |
| | | 28 | 32 | – | dB | TRX1,2,3,7,8 to TRX4,5,6 (f = 2400- 2690 MHz) |
| | | 37 | 46 | – | dB | TX1 to all TRXports (f = 824-915 MHz) |
| | | 37 | 40 | – | dB | TX2 to all TRXports (f = 1710-1910 MHz) |
| | | 27 | 37 | – | dB | TRX4 to TRX6 |
| | | 19 | 25 | – | dB | TRX1 to TRX2, TRX2 to TRX3, TRX4 to TRX5, TRX5 to TRX6 |
| | | 34 | 35 | – | dB | ANT to TRX7 (RX1) (active path: ANT - TRX8) (f = 1805-1910 MHz) |
| | | 37 | 40 | – | dB | ANT to TRX8 (RX2) (active path: ANT - TRX7) (f = 1805-1910 MHz) |
| Switching Time | | | | | | |
| On/Off | $t_{on/off}$ | – | 1 | – | μs | 90% OFF to 90% ON; 90% ON to 90% OFF |

Table 4 RF Characteristics (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|------------|--------|------|------|---------|--------------------------------------|
| | | Min. | Typ. | Max. | | |
| Boost Converter Settling Time | t_{BC} | – | – | 25 | μ s | After power down mode |
| Intermodulation Distortion (UMTS Band 1, Band 5) | | | | | | |
| IMD2, low | IMD2 low | – | -102 | -97 | dBm | Tx = 20 dBm, Interferer = -15 dBm |
| IMD2, high | IMD2 high | – | -105 | -97 | dBm | Tx = 20 dBm, Interferer = -15 dBm |
| IMD3 | IMD3 | – | -115 | -97 | dBm | Tx = 20 dBm, Interferer = -15 dBm |
| Harmonic Generation up to 12.75 GHz | | | | | | |
| TXLB, H2 | P_{Harm} | 77 | 88 | – | dBc | 35 dBm, 50 Ω , 50% duty cycle |
| TXLB, H3 | | 86 | 100 | – | dBc | 35 dBm, 50 Ω , 50% duty cycle |
| TXHB, H2 | | 82 | 98 | – | dBc | 32 dBm, 50 Ω , 50% duty cycle |
| TXHB, H3 | | 77 | 82 | – | dBc | 32 dBm, 50 Ω , 50% duty cycle |
| TRX1-8, H2 | | 81 | 88 | – | dBc | 25 dBm, 50 Ω |
| TRX1-8, H3 | | 85 | 97 | – | dBc | 25 dBm, 50 Ω |
| Harmonic Attenuation | | | | | | |
| TXLB | P_{att} | 27 | 38 | – | dB | 1648 to 1830 MHz |
| | | 27 | 33 | – | dB | 2472 to 2745 MHz |
| | | 20 | 27 | – | dB | 2746 to 12750 MHz |
| TXHB | | 27 | 38 | – | dB | 3420 to 3820 MHz |
| | | 25 | 30 | – | dB | 5130 to 5730 MHz |
| | | 23 | 27 | – | dB | 5731 to 12750 MHz |

Note: All electrical characteristics are measured with all RF ports terminated in 50 Ω and recommended circuit.

5 Pin Definition and Package Outline

Table 5 Pin Configuration

| Pin No. | Name | Pin Type | Buffer Type | Function |
|---------|------|----------|-------------|------------------------------|
| 0 | GND | GND | | Ground, Die Pad |
| 1 | GND | GND | | RF Ground |
| 2 | TRX4 | I/O | | WCDMA TRX-Port |
| 3 | TRX5 | I/O | | WCDMA TRX-Port |
| 4 | TRX6 | I/O | | WCDMA TRX-Port |
| 5 | GND | GND | | RF Ground |
| 6 | GND | GND | | RF Ground |
| 7 | ANT | I/O | | Antenna Port |
| 8 | GND | GND | | RF Ground |
| 9 | GND | GND | | RF Ground |
| 10 | TX2 | I | | GSM HB-Port |
| 11 | GND | GND | | RF Ground |
| 12 | GND | GND | | RF Ground |
| 13 | TX1 | I | | GSM LB-Port |
| 14 | GND | GND | | RF Ground |
| 15 | TRX8 | I/O | | WCDMA TRX-Port (GSM RX-Port) |
| 16 | GND | GND | | RF Ground |
| 17 | TRX7 | I/O | | WCDMA TRX-Port (GSM RX-Port) |
| 18 | TRX1 | I/O | | WCDMA TRX-Port |
| 19 | TRX2 | I/O | | WCDMA TRX-Port |
| 20 | TRX3 | I/O | | WCDMA TRX-Port |
| 21 | GND | GND | | DC Ground |
| 22 | VDD | PWR | | Supply Voltage |
| 23 | V4 | I | | GPIO Control Ping |
| 24 | V3 | I | | GPIO Control Pin |
| 25 | V2 | I | | GPIO Control Pin |
| 26 | V1 | I | | GPIO Control Pin |

Table 6 Mechanical Data

| Parameter | Symbol | Value | Unit |
|----------------|--------|-----------|------|
| Package size | Size | 3.4 x 2.6 | mm |
| Package height | H | 0.73 | mm |

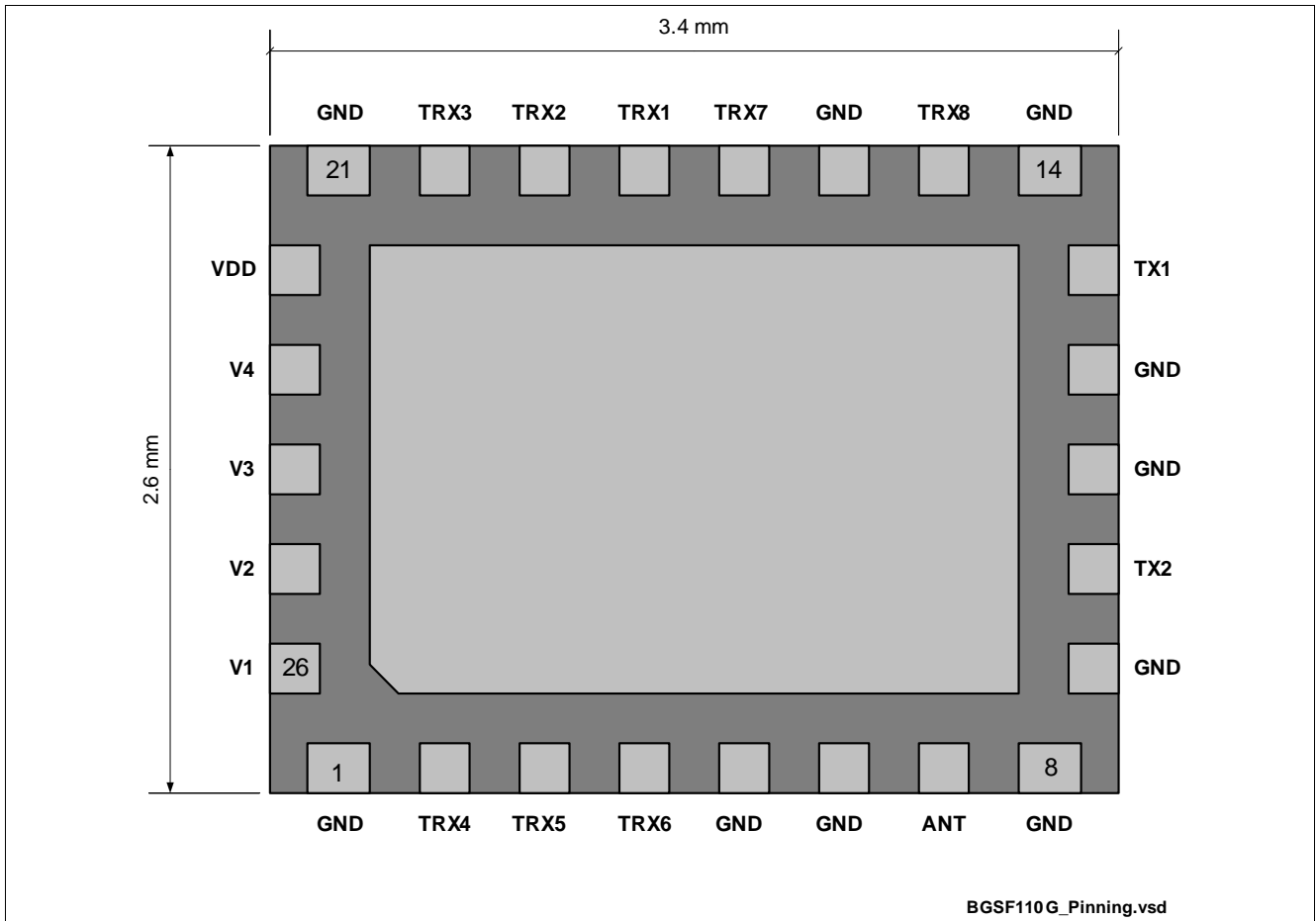


Figure 2 Pin Configuration (Top View)

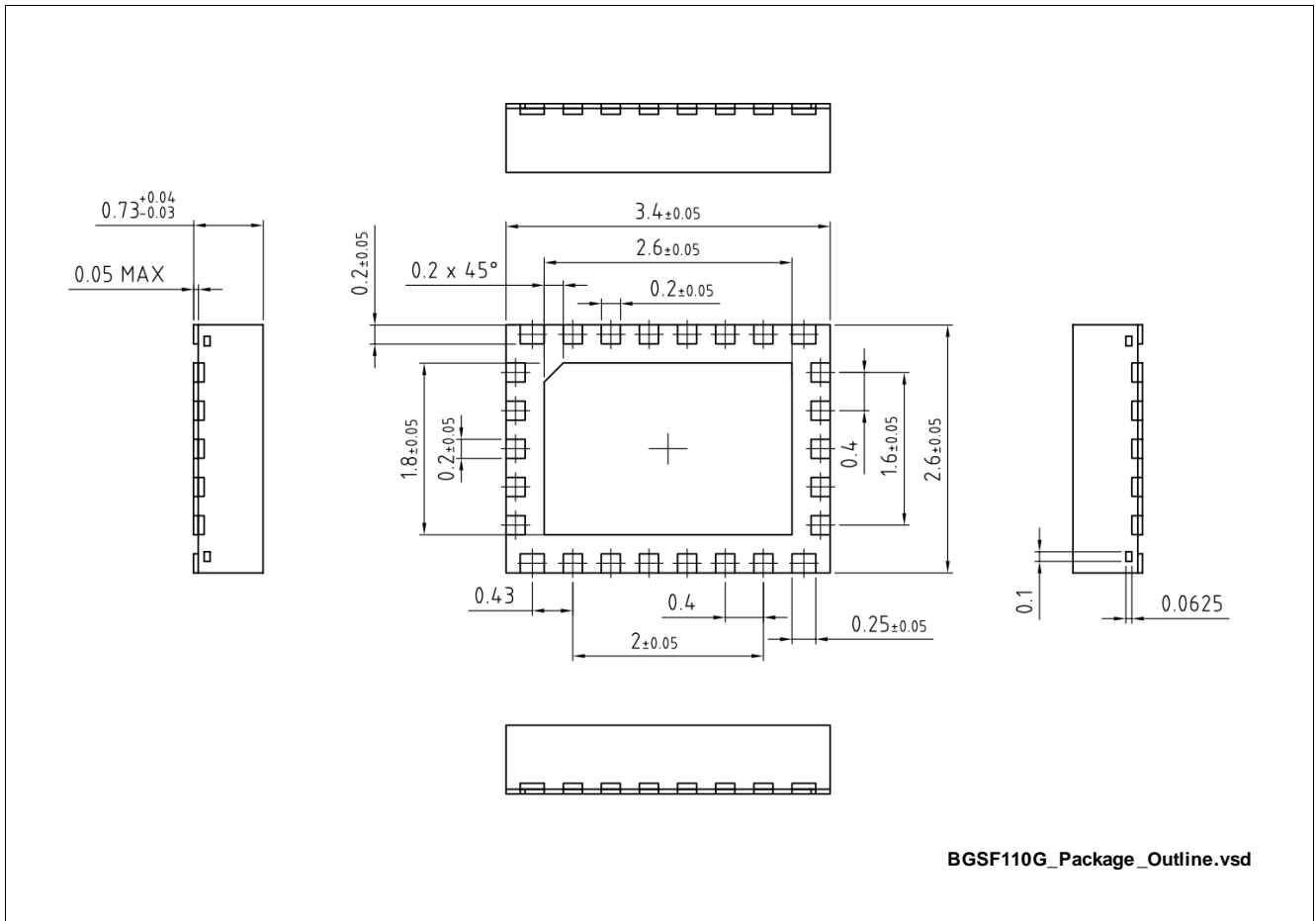


Figure 3 Package Outline

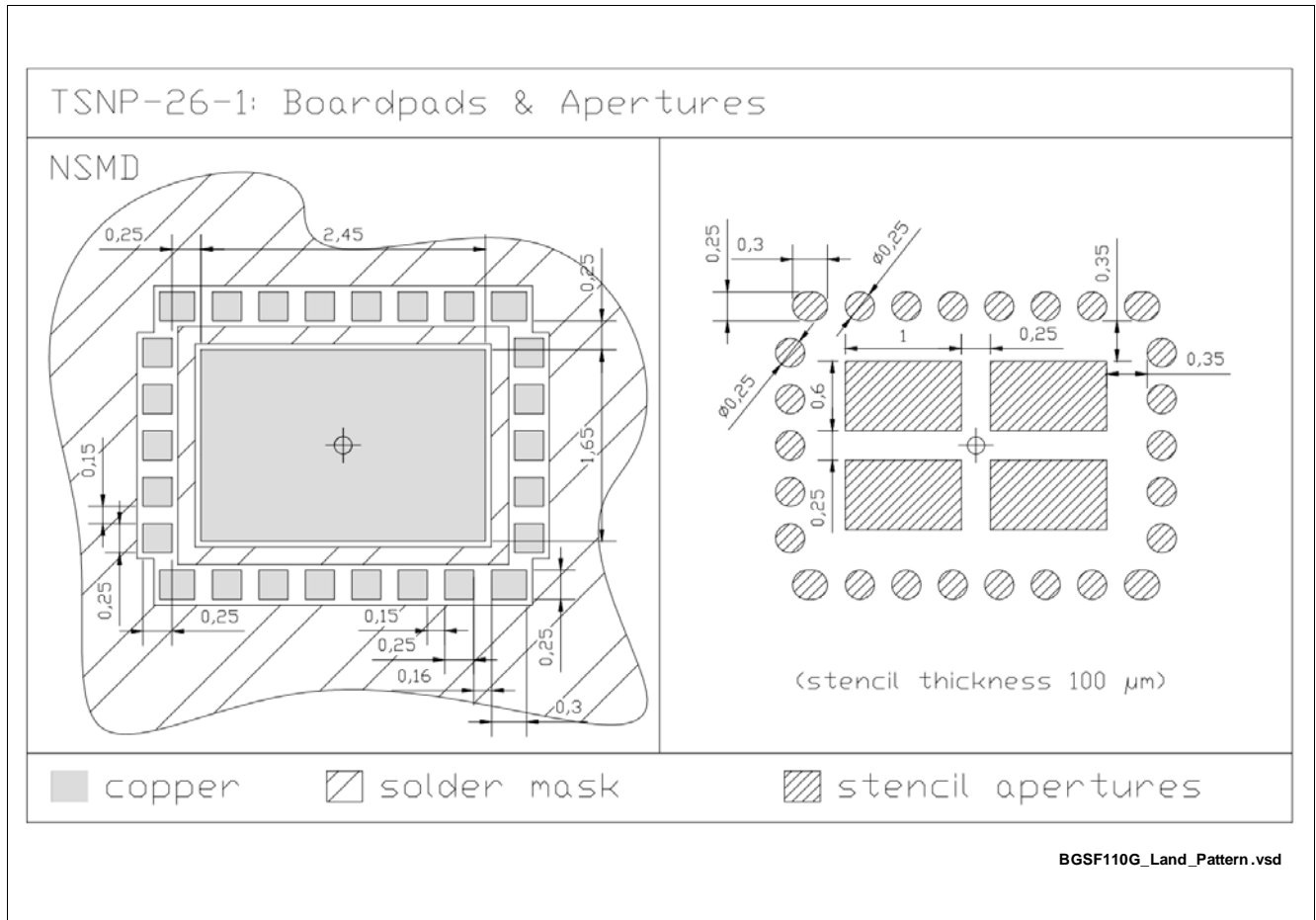


Figure 4 Land pattern

6 Band selection truth table

Table 7 GPIO truth table

| Mode | V1 | V2 | V3 | V4 |
|------------|----|----|----|----|
| ANT - TXLB | H | H | L | L |
| ANT - TXHB | H | L | L | L |
| ANT - TRX1 | L | L | H | L |
| ANT - TRX2 | H | L | H | L |
| ANT - TRX3 | H | H | H | L |
| ANT - TRX4 | H | L | H | H |
| ANT - TRX5 | H | H | H | H |
| ANT - TRX6 | H | L | L | H |
| ANT - TRX7 | L | H | H | L |
| ANT - TRX8 | L | H | L | L |
| Isolation | L | L | L | L |

Note: $H = V_{CtrlH}$, $L = V_{CtrlL}$

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