BGSX22GN10

RF Antenna Cross Switch

Data Sheet

Revision 3.5, 2016-02-02

Industrial and Multi-Market

Edition February 2, 2016

Published by Infineon Technologies AG
81726 Munich, Germany

Information

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Revision History

Document No.: *BGSX22GN10_data_sheet_v3.5.pdf*	
Revision History: 3.5	
Previous Version: 3.4	
Page	**Subjects (major changes since last revision)**
6,8	RF frequency range updated
8	Ambient temperature updated
9	Insertion loss, return loss and isolation performance updated

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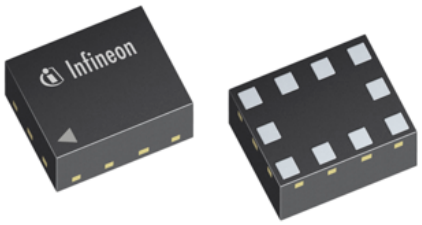
BGSX22GN10 RF Antenna Cross Switch

1 Features



- Antenna cross switch with power handling capability of up to 35 dBm
- Low insertion loss
- Low harmonic generation
- High port-to-port-isolation
- 0.1 to 3.8 GHz coverage
- High ESD robustness
- On-chip control logic
- Very small leadless and halogen free package TSNP-10-1 (1.1x1.5 mm^2) with super low height of 0.375 mm
- No decoupling capacitors required if no DC applied on RF lines
- RoHS compliant package

RoHS

2 Product Description

The BGSX22GN10 RF MOS switch is specifically designed for dual antenna applications.

This single supply chip integrates on-chip CMOS logic driven by a simple, single-pin CMOS or TTL compatible control input signal. The 0.1 dB compression point exceeds the switch's maximum input power level, resulting in linear performance at all signal levels. The RF switch has a very low insertion loss of 0.35 dB in the 1 GHz and 0.60 dB in the 2.5 GHz range.

Unlike GaAs technology, external DC blocking capacitors at the RF ports are only required if DC voltage is applied externally.

The BGSX22GN10 RF switch is manufactured in Infineon's patented MOS technology, offering the performance of GaAs with the economy and integration of conventional CMOS including the inherent higher ESD robustness.

The device has a very small size of only 1.1x1.5mm^2 and a maximum height of 0.375 mm.

Table 1: Ordering Information

Type	Package	Marking
BGSX22GN10	TSNP-10-1	X2

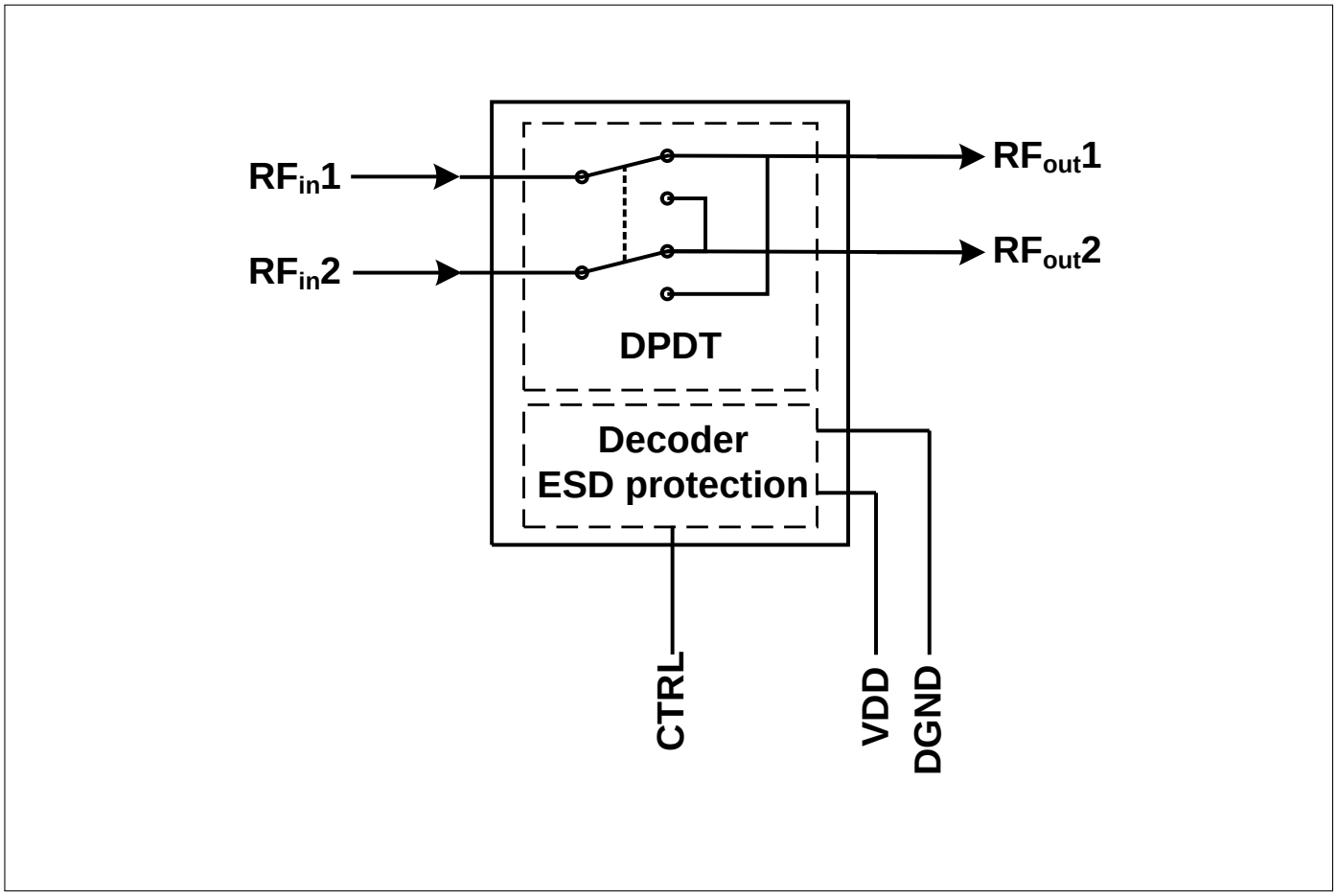


Figure 1: BGSX22GN10 block diagram

Table 2: Truth Table

Switched Paths	Ctrl
RFin1/2 - RFout1/2	0
RFin1/2 - RFout2/1	1

Note: When V_{dd} is applied the control pin has to be set to a defined logic level to ensure a proper operation of the switch.

3 Maximum Ratings

Table 3: Maximum Ratings at T_A = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_{dd}	-0.5	–	3.6	V	–
Maximum DC voltage on other pins	V_{DC}	0	–	0	V	No external DC voltage allowed
Storage temperature range	T_{STG}	-65	–	150	°C	–
RF input power	P_{RF}	–	–	36	dBm	–
Junction temperature	T_j	–	–	125	°C	–
ESD Capability						
Human body model [1]	V_{ESD_HBM}	−1	–	+1	kV	–
ESD capability RFin Port [2]	V_{ESD_RFin}	−8	–	−8	kV	RFin versus GND, with 27 nH shunt inductor

[1] Human Body Model ANSI/ESDA/JEDEC JS-001-2012 (R = 1.5 kΩ, C = 100 pF).
[2] IEC 61000-4-2 (R = 330 Ω, C = 150 pF), contact discharge.

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.

4 Operation Ranges

Table 4: Operation Ranges

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Ambient temperature	T_A	-40	25	85	°C	–
RF frequency	f	0.1	–	3.8	GHz	–
Supply voltage	V_{dd}	1.8	–	3.3	V	–
Control voltage low	V_{Ctrl_L}	-0.3	–	0.45	V	–
Control voltage high	V_{Ctrl_H}	1.35	–	V_{DD}	V	–

Table 5: RF Input Power

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
RF input power (50Ω)	P_{In}	–	–	35	dBm	50 % Duty Cycle

5 RF Characteristics

Table 6: RF Characteristics at T_A = -40 ... +85 °C, P_{IN} = 0 *dBm*, supply voltage V_{DD} = 1.8 ... 3.3 *V*, unless otherwise specified

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion Loss						
All RF ports	*IL*	0.25	0.35	0.50	dB	824-915 MHz
		0.40	0.50	0.65	dB	1710-1910 MHz
		0.45	0.60	0.80	dB	2170-2690 MHz
		0.70	0.85	1.10	dB	3400-3600 MHz
		0.75	0.95	1.20	dB	3600-3800 MHz
Return Loss						
All RF ports	*RL*	22	25	29	dB	824-915 MHz
		19	22	25	dB	1710-1910 MHz
		15	18	20	dB	2170-2690 MHz
		10	14	17	dB	3400-3600 MHz
		10	13	16	dB	3600-3800 MHz
Isolation						
RFin1/2 to RFout1/2	*ISO*	22	25	29	dB	824-915 MHz
		19	22	25	dB	1710-1910 MHz
		15	18	20	dB	2170-2690 MHz
		14	15	16	dB	3400-3600 MHz
		13	14	15	dB	3600-3800 MHz
Harmonic Generation up to 12.75 GHz						
All RF ports, 2nd harmonic	P_{Harm}	-98	-108	-111	dBc	f = 786.5 *MHz*, P_{in} = 26 *dBm*, CW, 50Ω
		-105	-114	-122	dBc	f = 824 *MHz*, P_{in} = 25 *dBm*, CW, 50Ω
		-99	-106	-111	dBc	f = 824 *MHz*, P_{in} = 35 *dBm*, CW, 50Ω
		-112	-122	-128	dBc	f = 1800 *MHz*, P_{in} = 25 *dBm*, CW, 50Ω
		-102	-115	-121	dBc	f = 1800 *MHz*, P_{in} = 35 *dBm*, CW, 50Ω
All RF ports, 3rd harmonic	P_{Harm}	-102	-112	-115	dBc	f = 786.5 *MHz*, P_{in} = 26 *dBm*, CW, 50Ω
		-108	-110	-113	dBc	f = 824 *MHz*, P_{in} = 25 *dBm*, CW, 50Ω
		-92	-97	-104	dBc	f = 824 *MHz*, P_{in} = 35 *dBm*, CW, 50Ω
		-109	-116	-122	dBc	f = 1800 *MHz*, P_{in} = 25 *dBm*, CW, 50Ω
		-88	-94	-105	dBc	f = 1800 *MHz*, P_{in} = 35 *dBm*, CW, 50Ω

Table 7: RF Characteristics II

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
All RF ports, all other harmonics	P_{Harm}	–	–	-90	dBc	P_{in} = 25 *dBm*, CW, 50Ω
		–	–	-83	dBc	P_{in} = 35 *dBm*, CW, 50Ω
Intermodulation Distortion in Rx Band[1]						
2nd order input refered intercept point (all TRx Ports)	*IIP2*	102	120	127	dBm	f = 0.1 - 2.7 *GHz*, Tx = 20 dBm, Interferer = -15 dBm, 50Ω
3rd order input refered intercept point (TRX Ports)	*IIP3*	65	75	84	dBm	
Switching Time and Current Consumption						
RF rise time	$t_{10\%-90\%}$	–	1.0	1.5	µs	10% - 90% of RF signal
Ctrl to RF time	$t_{Ctrl-RF}$	–	3.5	5	µs	50% of Ctrl signal to 90% of RF signal
Supply current	I_{dd}	75	100	200	µA	–
Control current	I_{Ctrl}	–	1	–	µA	–

Note: All electrical characteristics are measured with all RF ports terminated by 50 Ω loads.

[1] T_A = *+25 °C*, V_{DD} = 2.6 *V*

6 Application Circuit Diagram

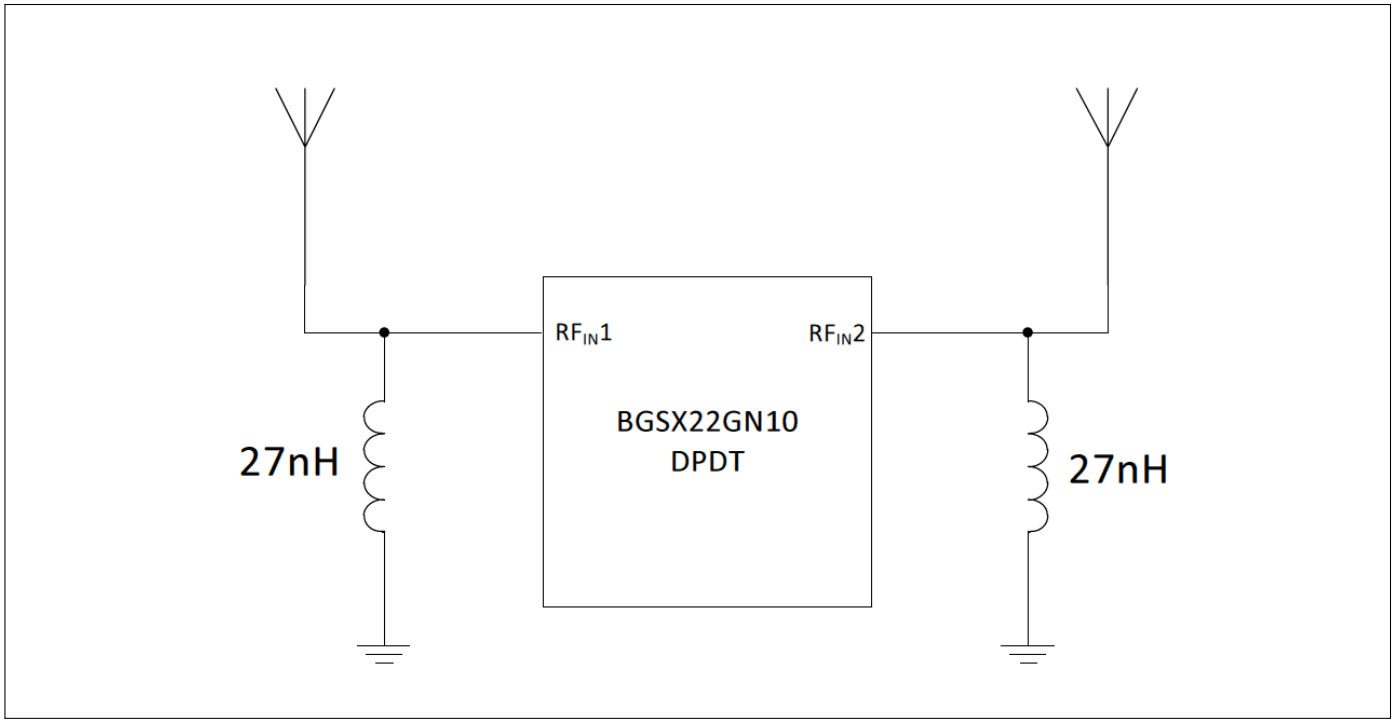


Figure 2: Application circuit

7 Pin Description

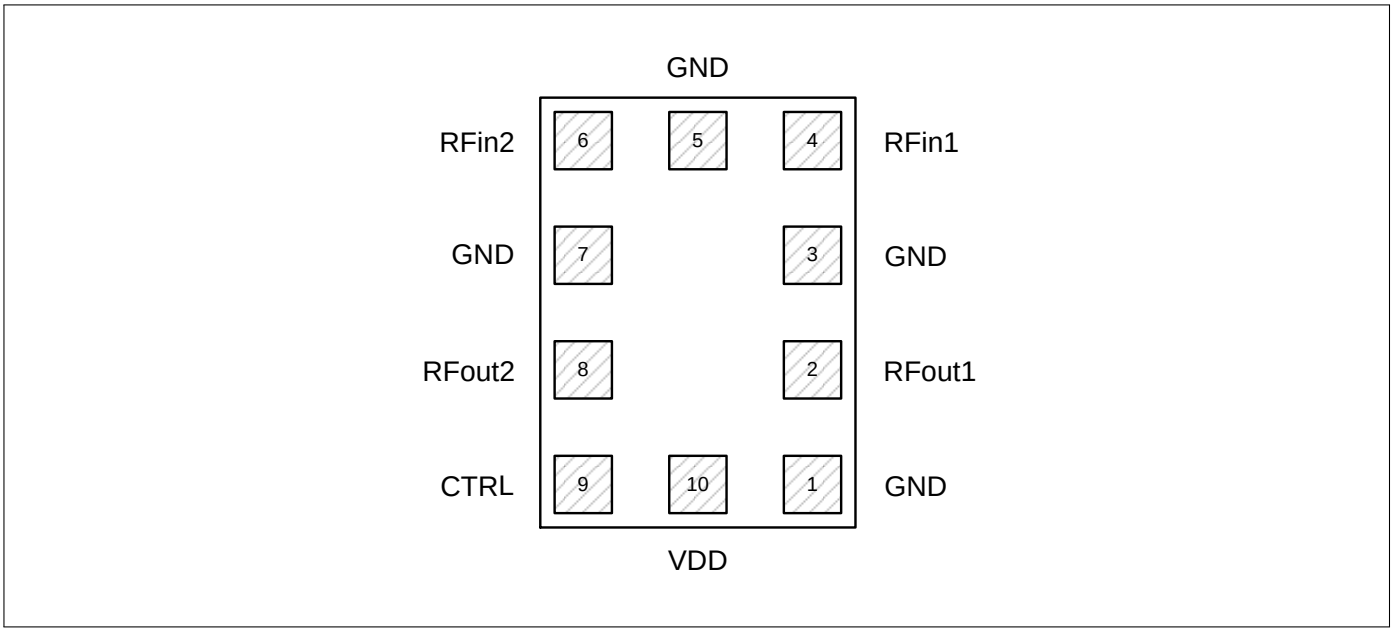


Figure 3: Pin configuration (top view)

Table 8: Pin Description

Pin No.	Name	Pin Type	Buffer Type	Function
1	GND	GND		Ground
2	RFout1	I/O		RF out 1
3	GND	GND		Ground
4	RFin1	I/O		RF in 1
5	GND	GND		Ground
6	RFin2	I/O		RF in 2
7	GND	GND		Ground
8	RFout2	I/O		RF out 2
9	CTRL	I		Control pin
10	Vdd	PWR		Supply voltage

8 Package Information

Table 9: Mechanical Data

Parameter	Symbol	Value	Unit
X-Dimension	*X*	1.1 ± 0.05	*mm*
Y-Dimension	*Y*	1.5 ± 0.05	*mm*
Size	*Size*	1.65	mm^2
Height	*H*	0.375	*mm*

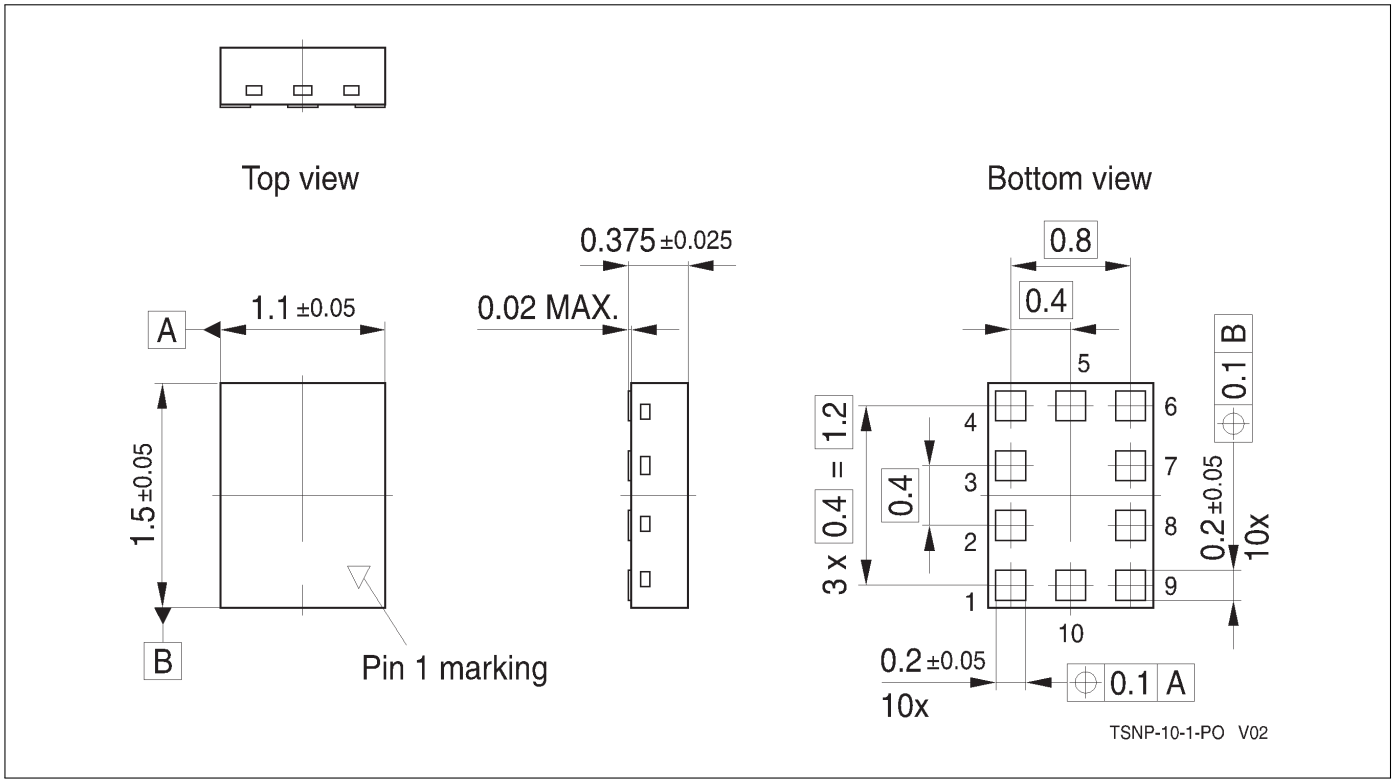


Figure 4: Package Outline

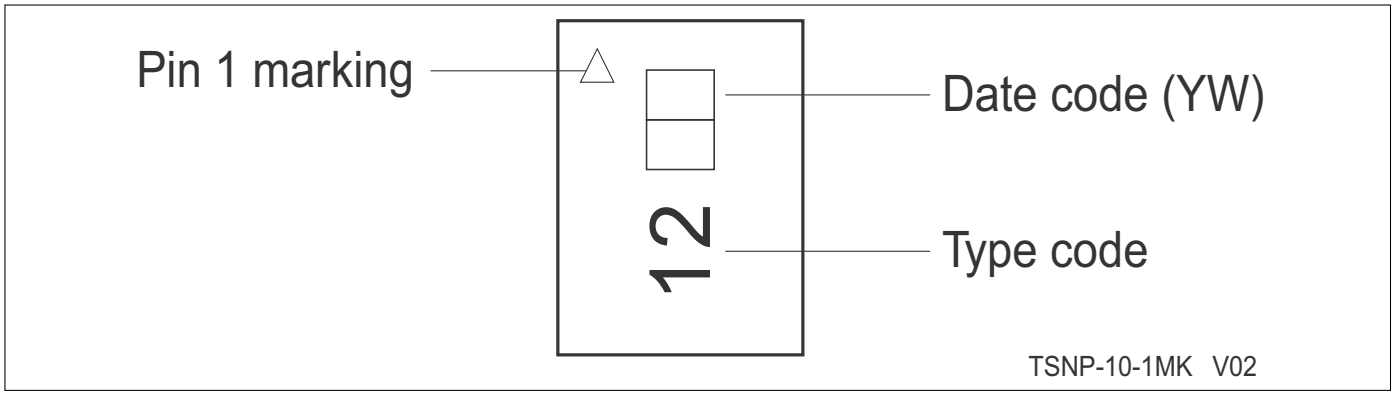


Figure 5: Laser marking

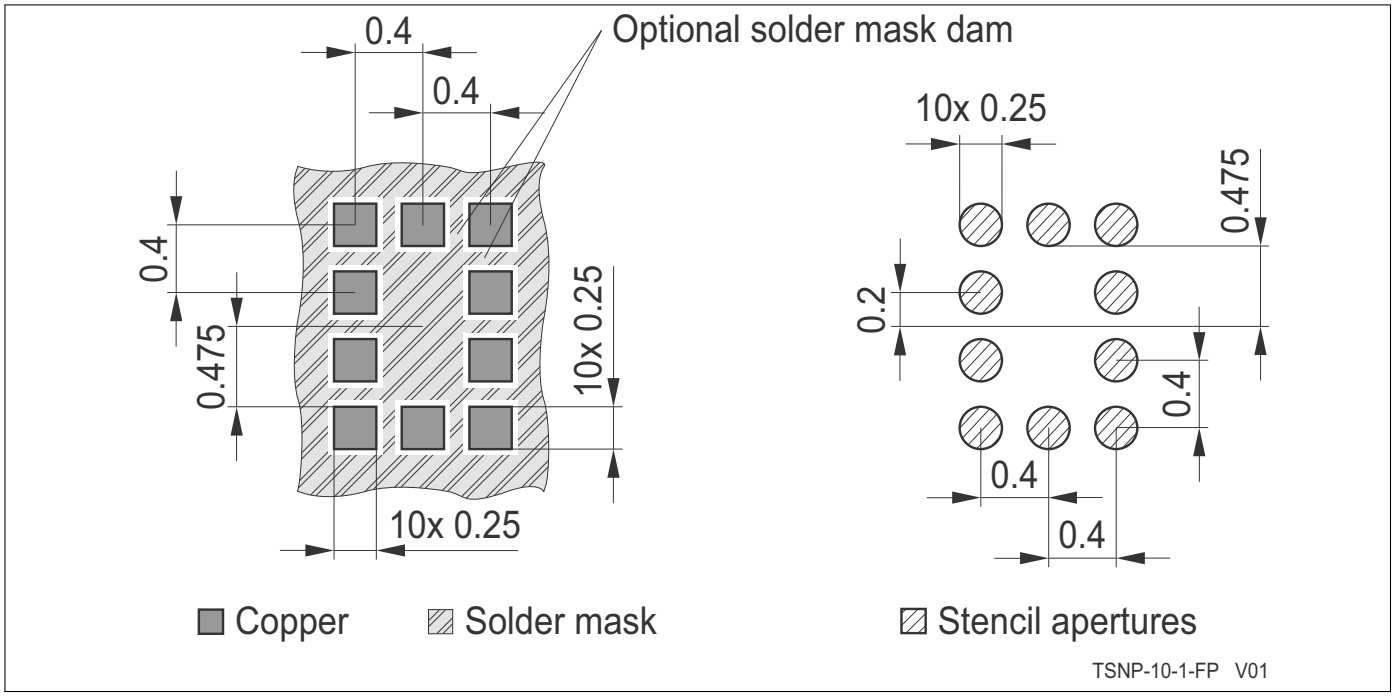


Figure 6: Land pattern / stencil mask

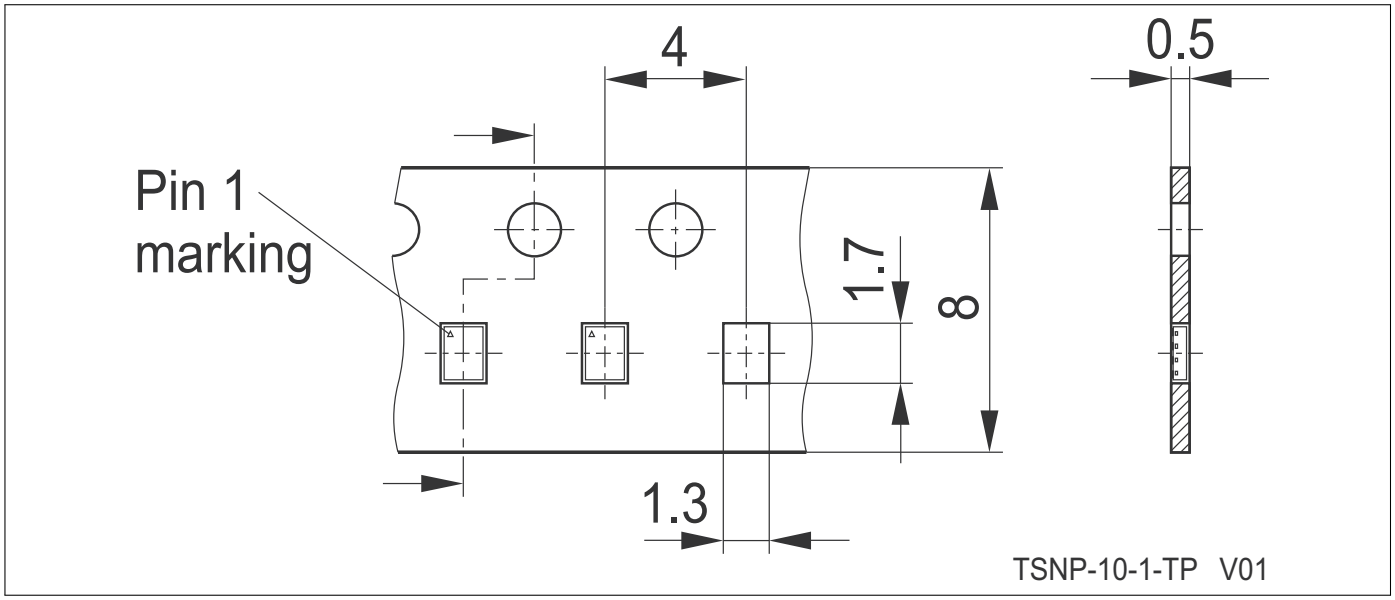


Figure 7: Carrier tape

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