

BGU7053

SiGe:C Low Noise High Linearity Amplifier

Rev. 2 — 21 February 2012

Product data sheet

1. Product profile

1.1 General description

The BGU7053 is a low noise high linearity amplifier for wireless infrastructure applications. The LNA has a high input and output return loss and is designed to operate between 2.3 GHz and 2.8 GHz. It is housed in a 3 mm × 3 mm × 0.85 mm 10-terminal plastic thin small outline package. The LNA is ESD protected on all terminals.

1.2 Features and benefits

- Low Noise Figure (NF) = 0.85 dB at 2500 MHz
- High linearity performance, $IP3O = 36$ dBm at 2500 MHz
- High input and output return loss
- Unconditionally stable
- 110 GHz transit frequency - SiGe:C technology
- Supply voltage 3.3 V
- Small 10-terminal leadless package 3 mm × 3 mm × 0.85 mm
- ESD protection on all terminals
- Moisture sensitivity level 1

1.3 Applications

- LNA for wireless infrastructure applications (2.3 GHz to 2.8 GHz)
- Low noise applications

1.4 Quick reference data

Table 1. Quick reference data

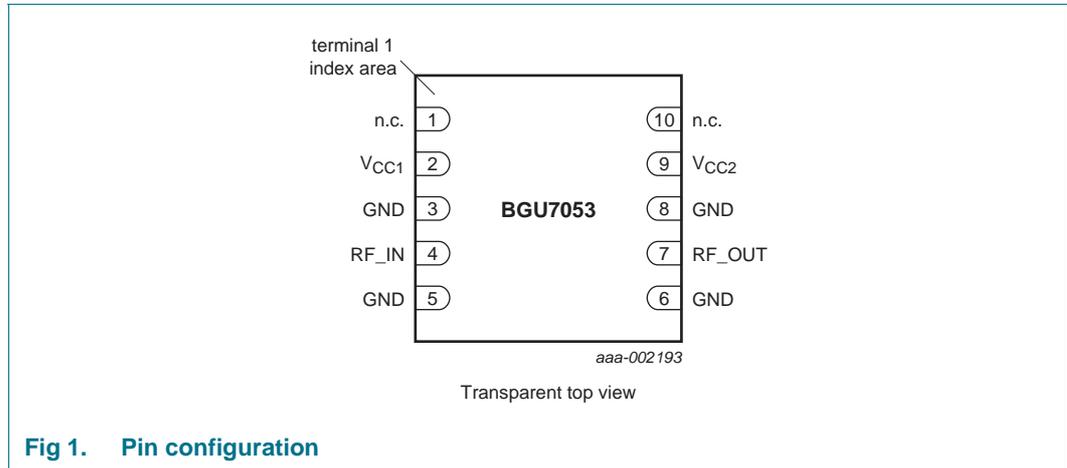
f = 2500 MHz; V_{CC} = 3.3 V; T_{amb} = 25 °C; input and output 50 Ω; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CC}	supply voltage		3.0	-	3.6	V
I _{CC}	supply current		70	90	110	mA
G _{ass}	associated gain		17	18.5	20	dB
NF	noise figure		-	0.85	1.1	dB
P _{L(1dB)}	output power at 1 dB gain compression		11.5	13.5	-	dBm
IP _{3O}	output third-order intercept point		33	36	-	dBm



2. Pinning information

2.1 Pinning



2.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
n.c.	1, 10	not connected
V _{CC1}	2	supply voltage
GND	3, 5, 6, 8	ground
RF_IN	4	RF input
RF_OUT	7	RF output
V _{CC2}	9	supply voltage

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BGU7053	HVSON10	plastic thermal enhanced very thin small outline package; no leads; 10 terminals; body 3 x 3 x 0.85 mm	SOT650-1

4. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V _{CC}	supply voltage		0	5	V
P _{I(RF)CW}	continuous waveform RF input power	V _{CC} = 3.3 V	-	20	dBm
T _{stg}	storage temperature		-65	+150	°C

Table 4. Limiting values ...continued

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
T_j	junction temperature		-	150	°C
T_{amb}	ambient temperature		-40	+85	°C
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM); According to JEDEC standard 22-A114E	-	4	kV
		Charged Device Model (CDM); According to JEDEC standard 22-C101B	-	2	kV

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		26	K/W

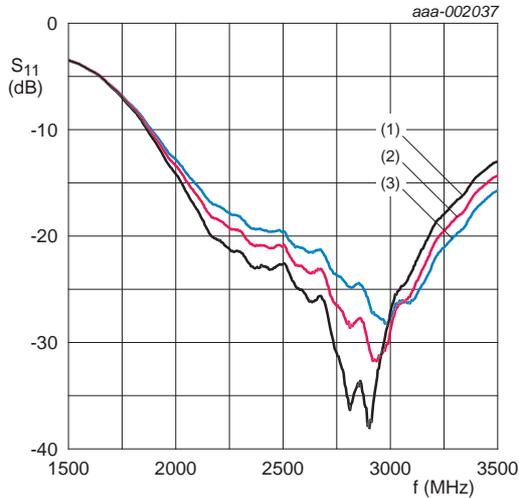
6. Characteristics

Table 6. Characteristics

$V_{CC} = 3.3\text{ V}$; $T_{amb} = 25\text{ °C}$; input and output $50\ \Omega$; unless otherwise specified. All RF parameters are measured at the device RF in and RF output terminals.

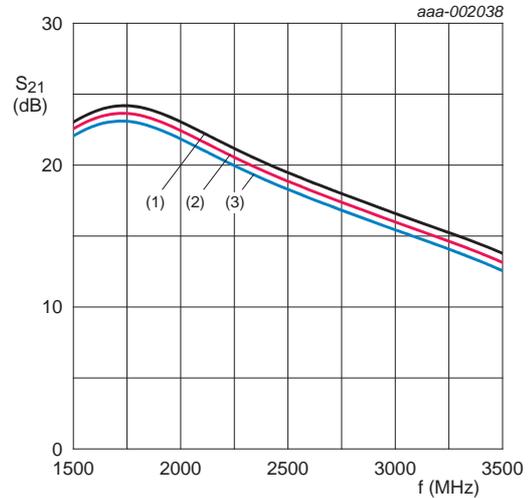
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	supply voltage		3.0	-	3.6	V
I_{CC}	supply current		70	90	110	mA
G_{ass}	associated gain	$f = 2500\text{ MHz}$	17	18.5	20	dB
		$f = 2700\text{ MHz}$	-	17.5	-	dB
NF	noise figure	$f = 2500\text{ MHz}$	-	0.85	1.1	dB
		$f = 2700\text{ MHz}$	-	0.90	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	$f = 2500\text{ MHz}$	11.5	13.5	-	dBm
		$f = 2700\text{ MHz}$	-	13	-	dBm
IP3O	output third-order intercept point	$f = 2500\text{ MHz}$	33	36	-	dBm
		$f = 2700\text{ MHz}$	-	36	-	dBm
RL_{in}	input return loss	$f = 2500\text{ MHz}$	-	23	-	dB
		$f = 2700\text{ MHz}$	-	26	-	dB
RL_{out}	output return loss	$f = 2500\text{ MHz}$	-	19.5	-	dB
		$f = 2700\text{ MHz}$	-	22.7	-	dB
ISL	isolation	$f = 2500\text{ MHz}$	-	25.5	-	dB
		$f = 2700\text{ MHz}$	-	23.5	-	dB
K	Rollett stability factor	$0\text{ GHz} \leq f \leq 25\text{ GHz}$	1	-	-	

6.1 Performance curves



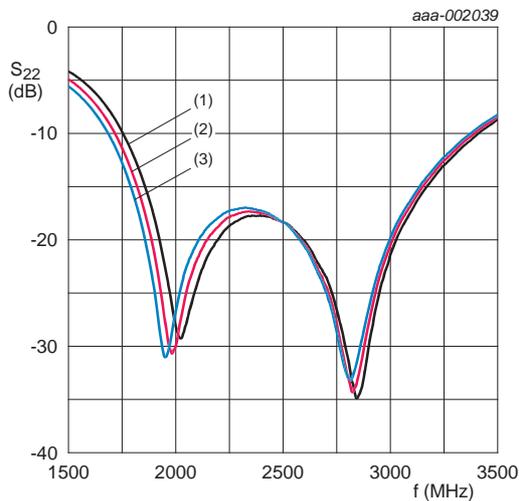
$V_{CC} = 3.3 \text{ V.}$
 (1) $T_j = -40 \text{ }^\circ\text{C}$
 (2) $T_j = 25 \text{ }^\circ\text{C}$
 (3) $T_j = 85 \text{ }^\circ\text{C}$

Fig 2. Input reflection coefficient as a function of frequency



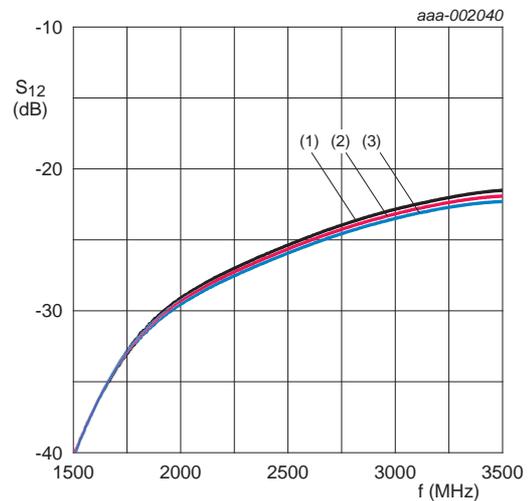
$V_{CC} = 3.3 \text{ V.}$
 (1) $T_j = -40 \text{ }^\circ\text{C}$
 (2) $T_j = 25 \text{ }^\circ\text{C}$
 (3) $T_j = 85 \text{ }^\circ\text{C}$

Fig 3. Forward transmission coefficient as a function of frequency



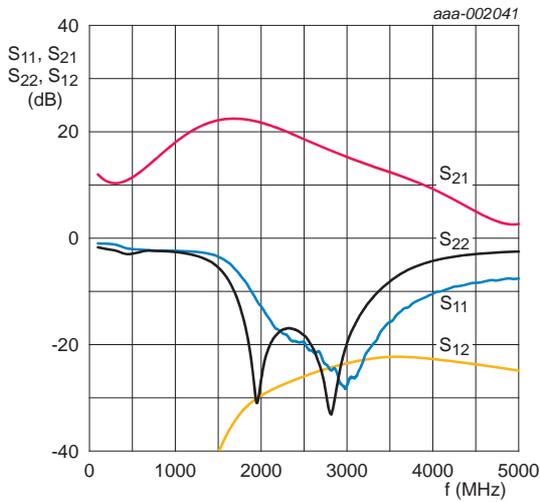
$V_{CC} = 3.3 \text{ V.}$
 (1) $T_j = -40 \text{ }^\circ\text{C}$
 (2) $T_j = 25 \text{ }^\circ\text{C}$
 (3) $T_j = 85 \text{ }^\circ\text{C}$

Fig 4. Output reflection coefficient as a function of frequency



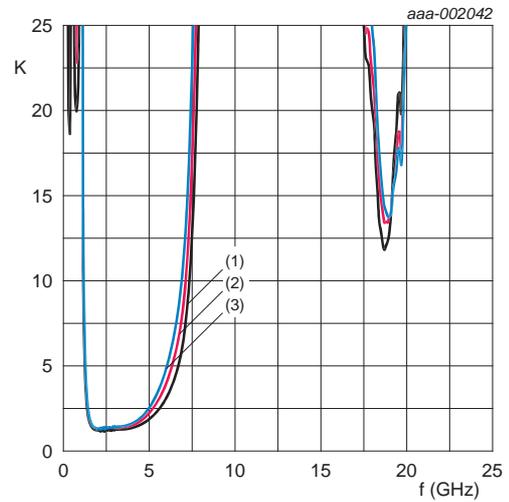
$V_{CC} = 3.3 \text{ V.}$
 (1) $T_j = -40 \text{ }^\circ\text{C}$
 (2) $T_j = 25 \text{ }^\circ\text{C}$
 (3) $T_j = 85 \text{ }^\circ\text{C}$

Fig 5. Reverse transmission coefficient as a function of frequency



$V_{CC} = 3.3 \text{ V}; T_{amb} = 25 \text{ }^\circ\text{C}.$

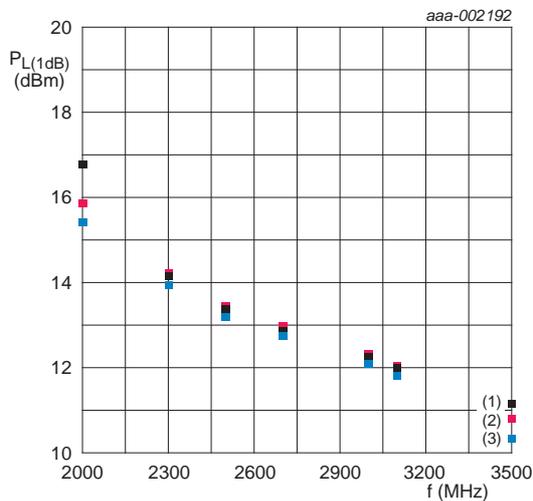
Fig 6. Wideband s-parameters as a function of frequency



$V_{CC} = 3.3 \text{ V}.$

- (1) $T_j = -40 \text{ }^\circ\text{C}$
- (2) $T_j = 25 \text{ }^\circ\text{C}$
- (3) $T_j = 85 \text{ }^\circ\text{C}$

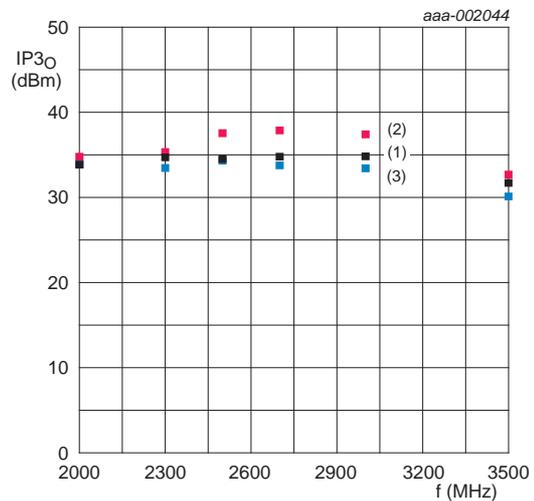
Fig 7. Stability K-factor as a function of frequency



$V_{CC} = 3.3 \text{ V}.$

- (1) $T_j = -40 \text{ }^\circ\text{C}$
- (2) $T_j = 25 \text{ }^\circ\text{C}$
- (3) $T_j = 85 \text{ }^\circ\text{C}$

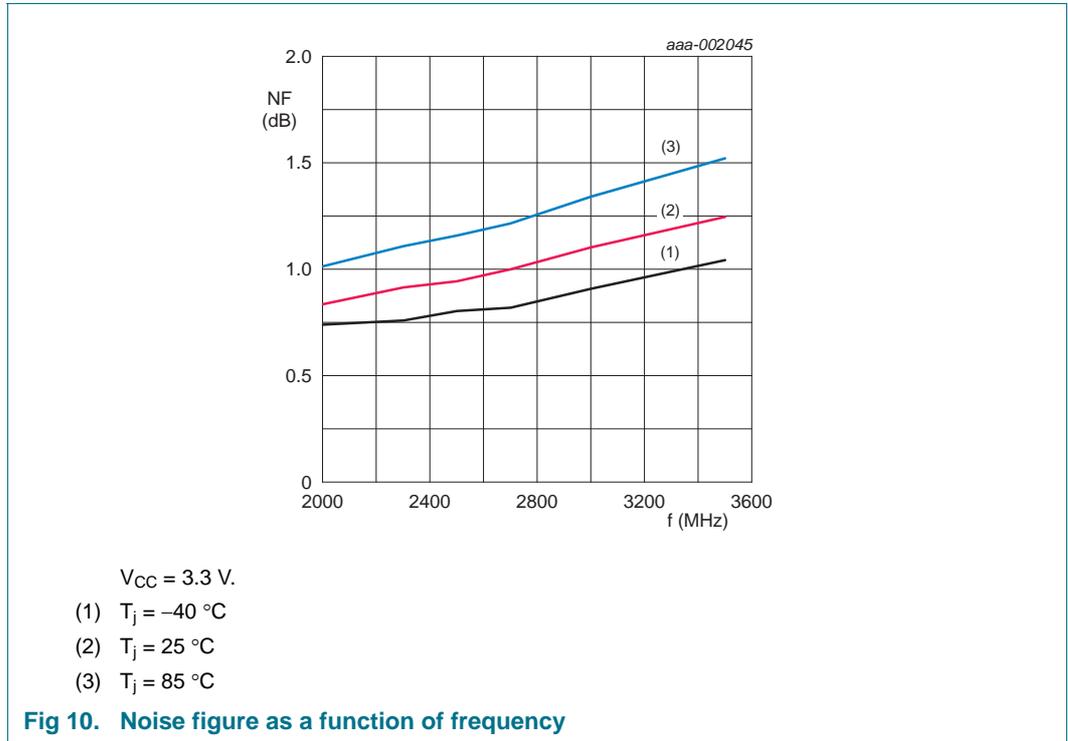
Fig 8. Output power at 1 dB gain compression as a function of frequency



$V_{CC} = 3.3 \text{ V}.$

- (1) $T_j = -40 \text{ }^\circ\text{C}$
- (2) $T_j = 25 \text{ }^\circ\text{C}$
- (3) $T_j = 85 \text{ }^\circ\text{C}$

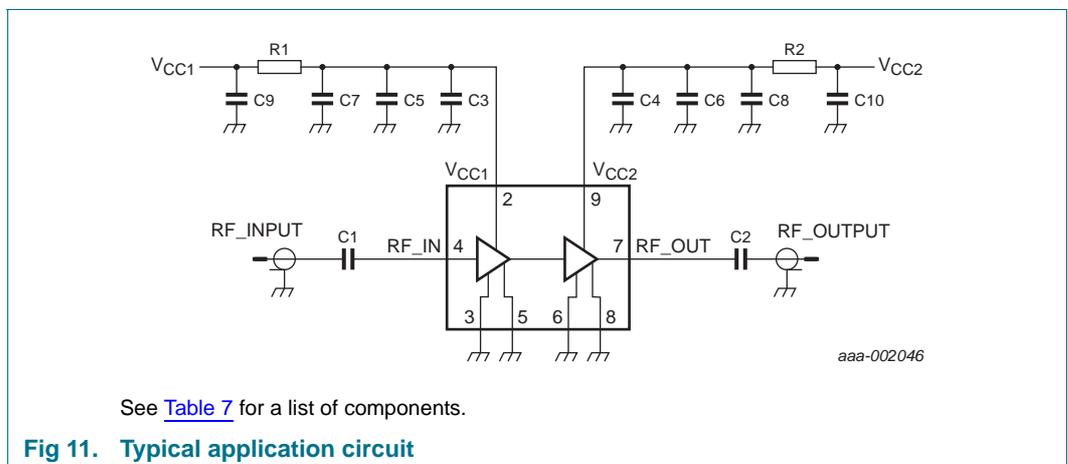
Fig 9. Output third-order intercept point as a function of frequency



7. Application information

Figure 11 shows the typical application circuit for the BGU7053. The device is internally matched to 50 Ω, and therefore does not need any external matching. The value of the input and output DC blocking C1 and C2 are recommended to be 1 nF. DC decoupling capacitors C3 and C4 should be located as close as possible to the BGU7053.

In case different system blocks are supplied via the same voltage rail, it is recommended to use a bias choke in the bias line on the positions of R1 and R2. The value of this choke is depending on the frequency that needs to be decoupled.



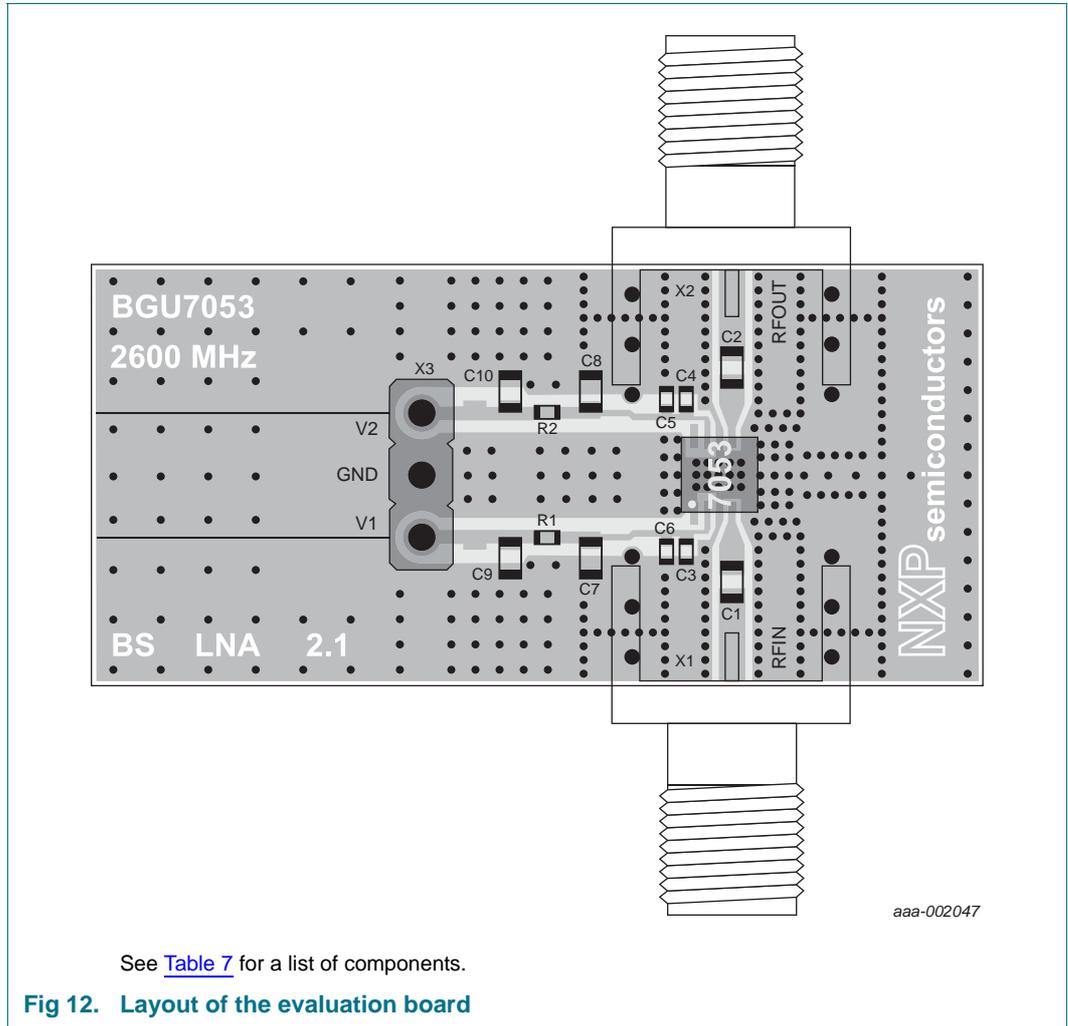


Table 7. List of components

See [Figure 11](#) for schematics.

Component	Description	Value	Size	Function
C1, C2	capacitor	[1] 1 nF	0603	DC block
C3, C6	capacitor	[1] 100 pF	0402	bias decoupling
C4, C5	capacitor	[1] 100 nF	0402	bias decoupling
C7, C8, C9, C10	capacitor	[2] 100 nF	0603	bias decoupling
R1, R2	resistor	0 Ω	0402	

[1] Murata GRM155 or capacitor of same quality.

[2] Murata GRM188 or capacitor of same quality.

8. Package outline

HVSON10: plastic thermal enhanced very thin small outline package; no leads;
10 terminals; body 3 x 3 x 0.85 mm

SOT650-1

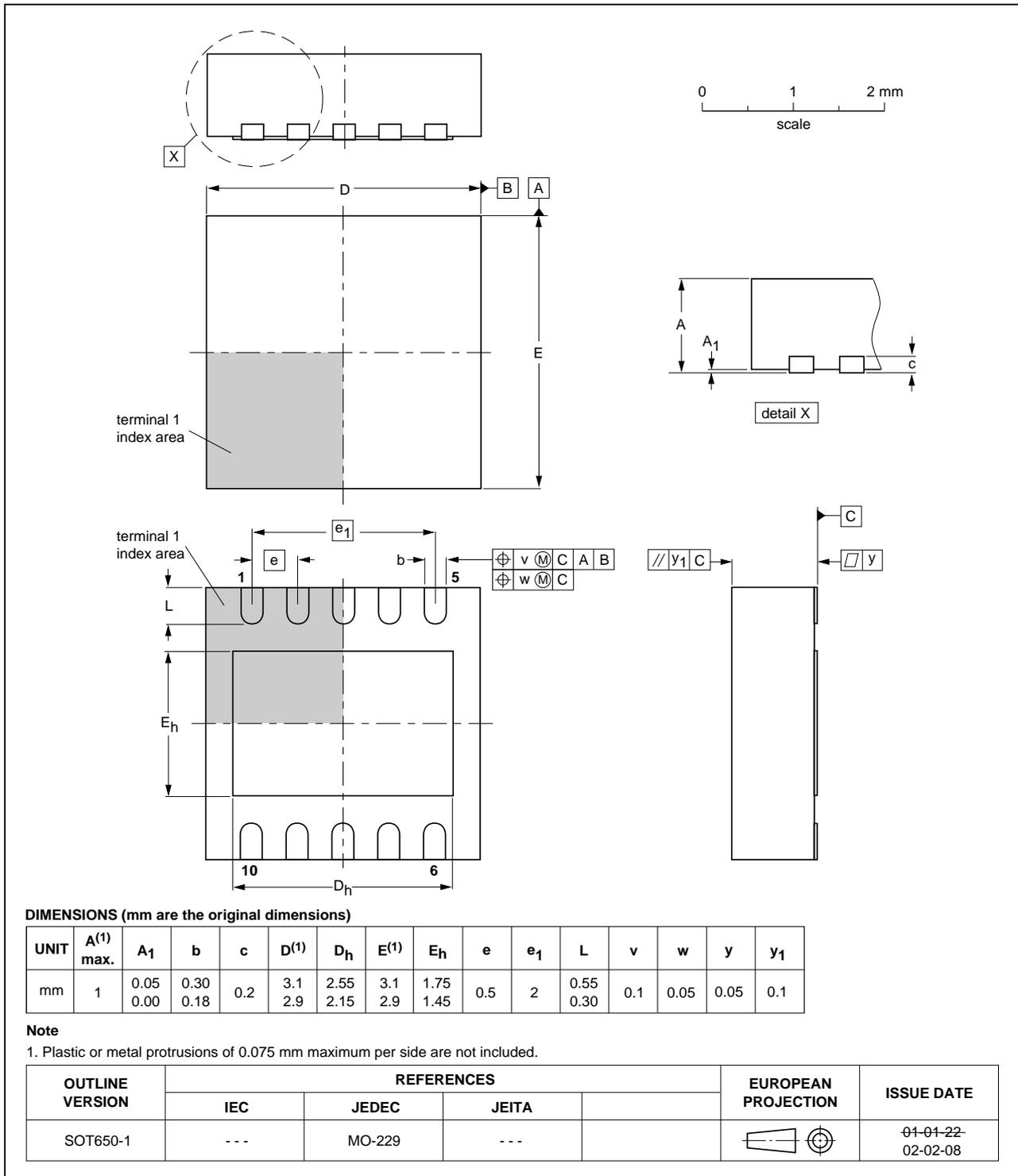


Fig 13. Package outline SOT650-1 (HVSON10)

9. Abbreviations

Table 8. Abbreviations

Acronym	Description
CW	Continuous Wave
ESD	ElectroStatic Discharge
LNA	Low Noise Amplifier
RF	Radio Frequency
SiGe:C	Silicon Germanium Carbon

10. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGU7053 v.2	20120221	Product data sheet	-	BGU7053 v.1
Modifications:	• Table 6 : updated			
BGU7053 v.1	20120214	Product data sheet	-	-

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Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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13. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
1.4	Quick reference data	1
2	Pinning information	2
2.1	Pinning	2
2.2	Pin description	2
3	Ordering information	2
4	Limiting values	2
5	Thermal characteristics	3
6	Characteristics	3
6.1	Performance curves	4
7	Application information	6
8	Package outline	8
9	Abbreviations	9
10	Revision history	9
11	Legal information	10
11.1	Data sheet status	10
11.2	Definitions	10
11.3	Disclaimers	10
11.4	Trademarks	11
12	Contact information	11
13	Contents	12

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