

# BFU610F

## NPN wideband silicon germanium RF transistor

Rev. 01 — 17 June 2010

Objective data sheet

## 1. Product profile

### 1.1 General description

NPN silicon germanium microwave transistor for high speed, low noise applications in a plastic, 4-pin dual-emitter SOT343F package.

### 1.2 Features and benefits

- 40 GHz  $f_T$  silicon germanium technology
- High associated gain 12 dB at 12 GHz
- Low noise high gain microwave transistor
- Noise figure (NF) = 1.4 dB at 5.8 GHz

### 1.3 Applications

- 2nd LNA stage and mixer stage in DBS LNB's
- Analog/digital cordless applications
- Ka band oscillators DRO's
- Low noise amplifiers for microwave communications systems
- Satellite radio
- WLAN and CDMA applications

### 1.4 Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{CBS}$	collector-base capacitance	$V_{CB} = 2 \text{ V}$ ; $f = 1 \text{ MHz}$ ; $V_{BE} = [\text{tbd}] \text{ V}$	-	70	-	fF
$f_T$	transition frequency	$V_{CE} = 2 \text{ V}$ ; $I_C = 25 \text{ mA}$ ; $f = 2 \text{ GHz}$ ; $T_{amb} = 25 \text{ °C}$	-	40	-	GHz
$G_{p(\text{max})}$	maximum power gain	$f = 5.8 \text{ GHz}$ ; $I_C = 8 \text{ mA}$ ; $V_{CE} = 2 \text{ V}$ ; $T_{amb} = 25 \text{ °C}$	[1]	-	21	dB
$h_{FE}$	DC current gain	$V_{CE} = 2 \text{ V}$ ; $I_C = 10 \text{ mA}$ ; $T_j = 25 \text{ °C}$	70	140	270	
$I_C$	collector current		-	-	10	mA
$P_{tot}$	total power dissipation	$T_{sp} \leq 90 \text{ °C}$ ; see <a href="#">Figure 1</a>	[2]	-	50	mW
$V_{CBO}$	collector-base voltage	$I_E = 0 \text{ A}$	-	-	10	V
$V_{CEO}$	collector-emitter voltage	$I_B = 0 \text{ A}$	-	-	5	V
$V_{EBO}$	emitter-base voltage	$I_C = 0 \text{ A}$	-	-	0.55	V

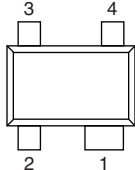
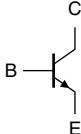
[1]  $G_{p(\text{max})}$  is the maximum power gain, if  $K > 1$ . If  $K < 1$  then  $G_{p(\text{max})} = \text{MSG}$ .

[2]  $T_{sp}$  is the temperature at the solder point of the emitter lead.



## 2. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	E	emitter		
2	B	base		
3	E	emitter		
4	C	collector		

SOT343F (DFP4)

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BFU610F	DFP4	Plastic surface-mounted flat pack package; 4 leads	SOT343F

## 4. Marking

Table 4. Marking codes

Type number	Marking code
BFU610F	D1

## 5. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{CBO}$	collector-base voltage	$I_E = 0$ A	-	-	10	V
$V_{CEO}$	collector-emitter voltage	$I_B = 0$ A	-	-	5	V
$V_{EBO}$	emitter-base voltage	$I_C = 0$ A	-	-	0.55	V
$I_C$	collector current		-	-	10	mA
$P_{tot}$	total power dissipation	$T_{sp} \leq 90$ °C; see <a href="#">Figure 1</a>			50	mW
$T_{stg}$	storage temperature		-65	-	150	°C
$T_j$	junction temperature		-	-	150	°C

[1]  $T_{sp}$  is the temperature at the solder point of the emitter lead.

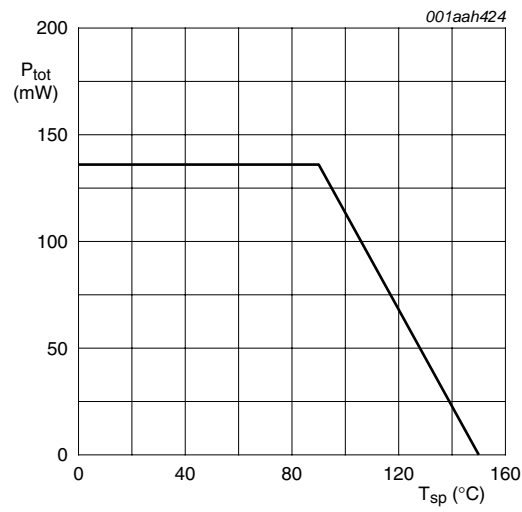


Fig 1. Power derating curve

## 6. Thermal characteristics

**Table 6. Thermal characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point		-	440	-	K/W

## 7. Characteristics

**Table 7. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_E = 0 \text{ mA}; I_C = 2.5 \text{ } \mu\text{A}; T_j = 25 \text{ } ^\circ\text{C}$	10	-	-	V	
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_B = 0 \text{ mA}; I_C = 1 \text{ mA}; T_j = 25 \text{ } ^\circ\text{C}$	5	-	-	V	
$I_{CBO}$	collector-base cut-off current	$I_E = 0 \text{ mA}; V_{CB} = 4.5 \text{ V}; T_j = 25 \text{ } ^\circ\text{C}$	-	-	100	nA	
$h_{FE}$	DC current gain	$V_{CE} = 2 \text{ V}; I_C = 10 \text{ mA}; T_j = 25 \text{ } ^\circ\text{C}$	70	140	270		
$C_{CBS}$	collector-base capacitance	$V_{CB} = 2 \text{ V}; f = 1 \text{ MHz}; V_{BE} = [\text{tbd}] \text{ V}$	-	70	-	fF	
$f_T$	transition frequency	$V_{CE} = 2 \text{ V}; I_C = 25 \text{ mA}; f = 2 \text{ GHz}; T_{amb} = 25 \text{ } ^\circ\text{C}$	-	40	-	GHz	
$G_{p(\text{max})}$	maximum power gain	$f = 5.8 \text{ GHz}; I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; T_{amb} = 25 \text{ } ^\circ\text{C}$	[1]	-	21	-	dB
		$f = 1.8 \text{ GHz}; I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; T_{amb} = 25 \text{ } ^\circ\text{C}$	[1]	-	29	-	dB
		$f = 1.5 \text{ GHz}; I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; T_{amb} = 25 \text{ } ^\circ\text{C}$	[1]	-	30.4	-	dB
		$f = 2.4 \text{ GHz}; I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; T_{amb} = 25 \text{ } ^\circ\text{C}$	[1]	-	28	-	dB
		$f = 12 \text{ GHz}; I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; T_{amb} = 25 \text{ } ^\circ\text{C}$	[1]	-	14.3	-	dB
$ s_{21} ^2$	insertion power gain	$I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; f = 1.5 \text{ GHz}; T_{amb} = 25 \text{ } ^\circ\text{C}$	-	19	-	dB	
		$I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; f = 1.8 \text{ GHz}; T_{amb} = 25 \text{ } ^\circ\text{C}$	-	18	-	dB	
		$I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; f = 2.4 \text{ GHz}; T_{amb} = 25 \text{ } ^\circ\text{C}$	-	17.5	-	dB	
		$I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; f = 5.8 \text{ GHz}; T_{amb} = 25 \text{ } ^\circ\text{C}$	-	13.4	-	dB	
		$I_C = 8 \text{ mA}; V_{CE} = 2 \text{ V}; f = 12 \text{ GHz}; T_{amb} = 25 \text{ } ^\circ\text{C}$	-	7.7	-	dB	
$P_{L(1\text{dB})}$	output power at 1 dB gain compression	$V_{CE} = 2 \text{ V}; f = 1.5 \text{ GHz}; I_C = 25 \text{ mA}; Z_L = 50 \text{ } \Omega; Z_S = 50 \text{ } \Omega$	-	[tbd]	-	dBmW	
		$V_{CE} = 2 \text{ V}; f = 2.4 \text{ GHz}; I_C = 25 \text{ mA}; Z_L = 50 \text{ } \Omega; Z_S = 50 \text{ } \Omega$	-	[tbd]	-	dBmW	
		$V_{CE} = 2 \text{ V}; f = 1.8 \text{ GHz}; I_C = 25 \text{ mA}; Z_L = 50 \text{ } \Omega; Z_S = 50 \text{ } \Omega$	-	[tbd]	-	dBmW	
		$V_{CE} = 2 \text{ V}; f = 5.8 \text{ GHz}; I_C = 25 \text{ mA}; Z_L = 50 \text{ } \Omega; Z_S = 50 \text{ } \Omega$	-	[tbd]	-	dBmW	

[1]  $G_{p(\text{max})}$  is the maximum power gain, if  $K > 1$ . If  $K < 1$  then  $G_{p(\text{max})} = \text{MSG}$ .

**8. Package outline**

Plastic surface-mounted flat pack package; reverse pinning; 4 leads

SOT343F

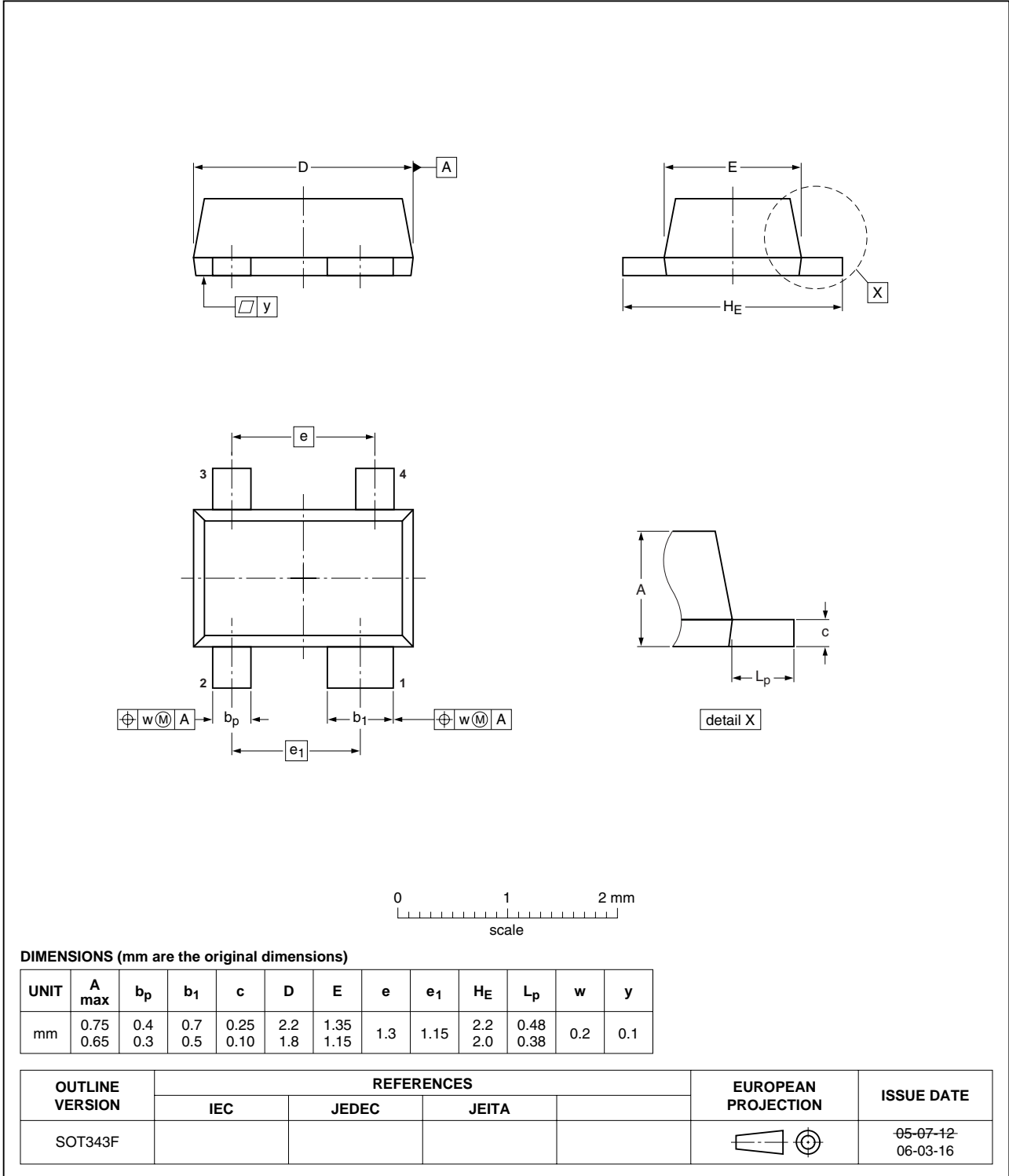


Fig 2. Package outline SOT343F (DFP4)

**9. Soldering**

Footprint information for reflow soldering

SOT343F

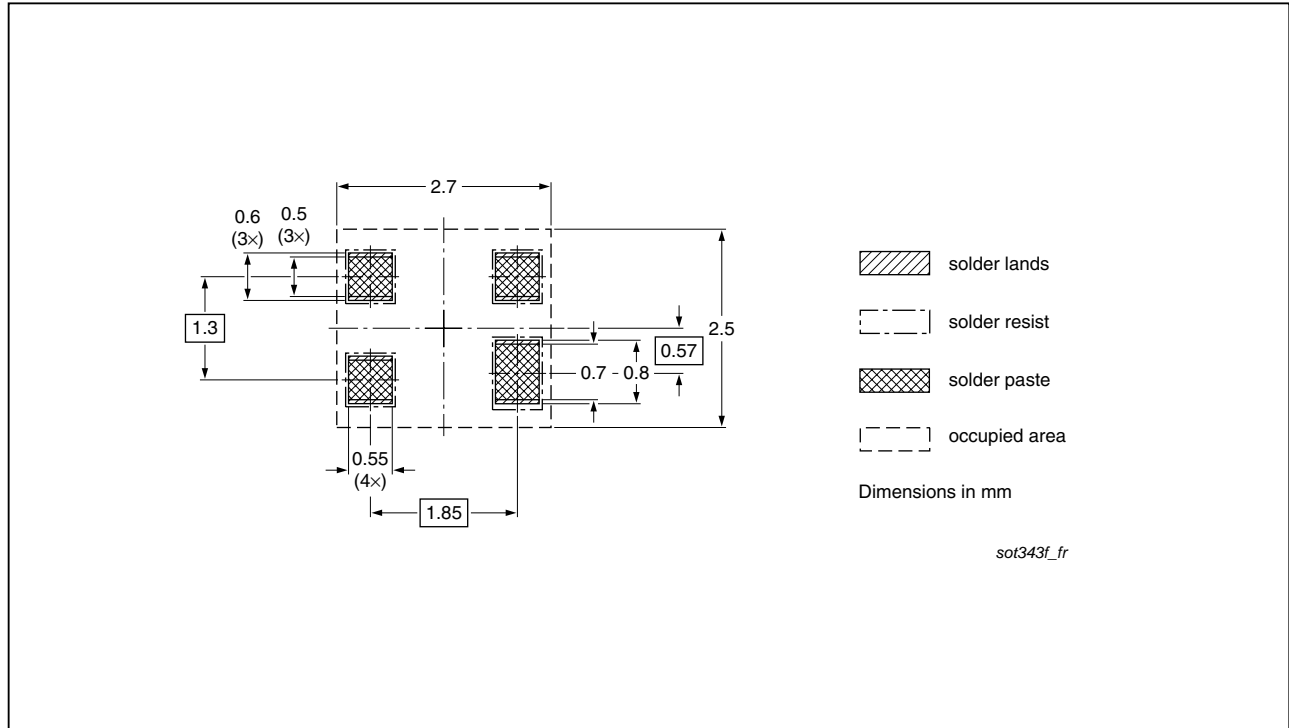


Fig 3. Reflow soldering footprint for SOT343F (DFP4)

Footprint information for wave soldering

SOT343F

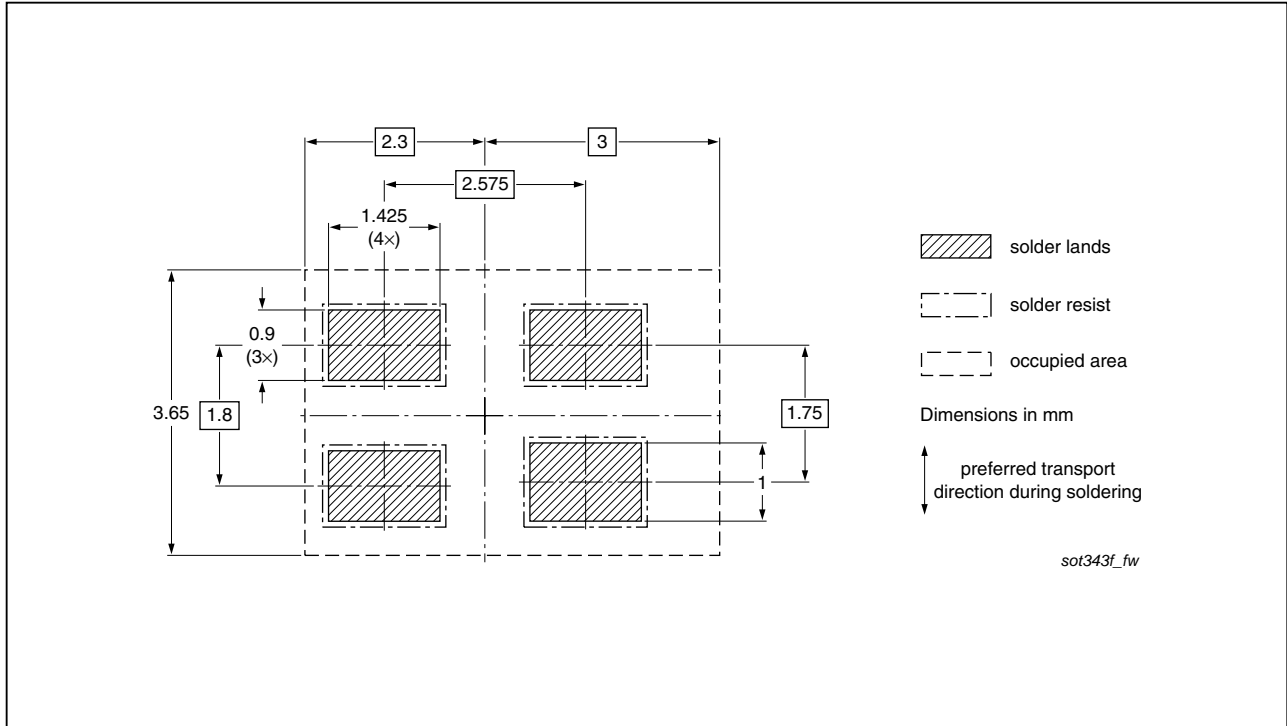


Fig 4. Wave soldering footprint for SOT343F (DFP4)



## 10. Revision history

**Table 8. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BFU610F v.1	20100617	Objective data sheet	-	-

## 11. Legal information

### 11.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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