

# DATA SHEET

## **BF689K** NPN 2 GHz wideband transistor

Product specification  
File under Discrete Semiconductors, SC14

September 1995

# NPN 2 GHz wideband transistor

# BF689K

### DESCRIPTION

NPN transistor in a plastic SOT54 (TO-92 variant) envelope. It is intended for application as an amplifier or oscillator in the VHF and UHF range.

### PINNING

PIN	DESCRIPTION
Code: F689	
1	emitter
2	base
3	collector

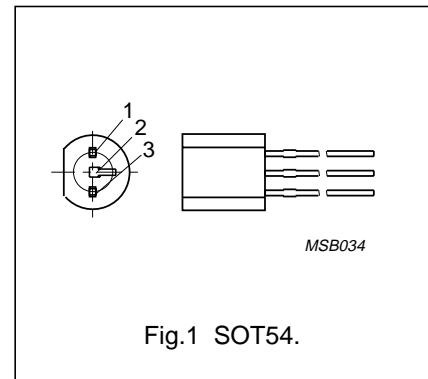


Fig.1 SOT54.

### QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–	25	V
$V_{CEO}$	collector-emitter voltage	open base	–	–	15	V
$I_C$	DC collector current		–	–	25	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 60\text{ °C}$	–	–	360	mW
$h_{FE}$	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}; T_j = 25\text{ °C}$	20	–	–	
		$I_C = 20\text{ mA}; V_{CE} = 5\text{ V}; T_j = 25\text{ °C}$	35	–	–	
$f_T$	transition frequency	$I_C = 15\text{ mA}; V_{CE} = 5\text{ V}; f = 500\text{ MHz}$	–	1.8	–	GHz

### LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	25	V
$V_{CEO}$	collector-emitter voltage	open base	–	15	V
$V_{CER}$	collector-emitter voltage	$R_{BE} \leq 50\ \Omega$	–	25	V
$V_{EBO}$	emitter-base voltage	open collector	–	3.5	V
$I_C$	DC collector current		–	25	mA
$I_{CM}$	peak collector current	$t_p < 1\ \mu s$	–	50	mA
$P_{tot}$	total power dissipation	up to $T_{amb} = 60\text{ °C}$	–	360	mW
$T_{stg}$	storage temperature		–55	150	°C
$T_j$	junction temperature		–	150	°C

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## THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air	250 K/W

## CHARACTERISTICS

 $T_j = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = 15\text{ V}$	–	–	50	nA
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = 2\text{ V}$	–	–	1	$\mu\text{A}$
$V_{CE\ sat}$	collector-emitter saturation voltage	$I_C = 25\text{ mA}; I_B = 1.25\text{ mA}$	–	–	1.0	V
$V_{BE\ sat}$	base-emitter saturation voltage	$I_C = 25\text{ mA}; I_B = 1.25\text{ mA}$	–	–	1.0	V
$h_{FE}$	DC current gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}$	20	–	–	
		$I_C = 20\text{ mA}; V_{CE} = 5\text{ V}$	35	–	–	
$f_T$	transition frequency	$I_C = 15\text{ mA}; V_{CE} = 5\text{ V}; f = 500\text{ MHz}$	–	1.8	–	GHz
$C_{re}$	feedback capacitance	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}; f = 1\text{ MHz}; T_{amb} = 25\text{ °C}$	–	1.1	–	pF
$G_p$	power gain	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}; T_{amb} = 25\text{ °C}; Z_S = 60\ \Omega; R_L = 2\text{ k}\Omega$	–	16	–	dB
		$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}; f = 200\text{ MHz}; T_{amb} = 25\text{ °C}; Z_S = 60\ \Omega; R_L = 920\ \Omega$	–	16	–	dB
F	noise figure	$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}; T_{amb} = 25\text{ °C}; Z_S = 60\ \Omega$	–	4	–	dB
		$I_C = 2\text{ mA}; V_{CE} = 5\text{ V}; f = 200\text{ MHz}; T_{amb} = 25\text{ °C}; Z_S = 60\ \Omega$	–	3	–	dB

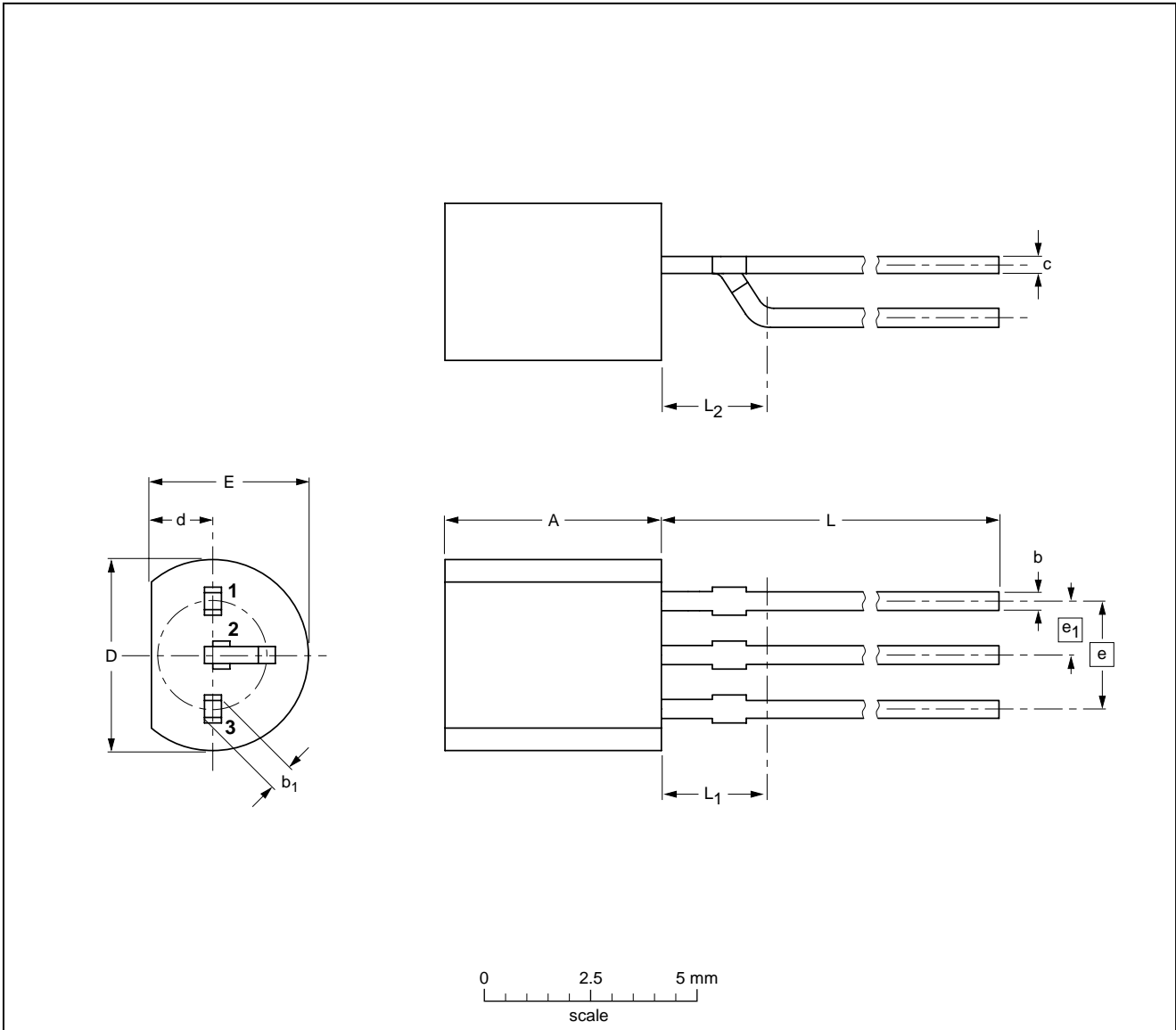
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads (on-circle)

SOT54 variant



DIMENSIONS (mm are the original dimensions)

UNIT	A	b	$b_1$	c	D	d	E	e	$e_1$	L	$L_1^{(1)}$ max	$L_2$ max
mm	5.2 5.0	0.48 0.40	0.66 0.56	0.45 0.40	4.8 4.4	1.7 1.4	4.2 3.6	2.54	1.27	14.5 12.7	2.5	2.5

Notes

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT54 variant		TO-92	SC-43		97-04-14

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**DEFINITIONS**

<b>Data Sheet Status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

**LIFE SUPPORT APPLICATIONS**

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