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BLF3G22-30

UHF power LDMOS transistor

Rev. 2 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

30 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 MHz

Table 1. Typical class-AB RF performance

I_{Dq} = 450 mA; T_h = 25 °C in a common source test circuit.

Mode of operation	f_1 (MHz)	f_2 (MHz)	V_{DS} (V)	I_{Dq} (mA)	$P_{L(PEP)}$ (W)	$P_{L(AV)}$ (W)	G_p (dB)	η_D (%)	IMD (dBc)	ACPR (dBc)	IMD3 (dBc)
2-tone	2170	2170.1	28	450	36	-	14	34	–24	-	-
2-carrier W-CDMA[1]	2115	2165	28	450	-	6	15	21	-	–42[2]	–38

[1] 3GPP test model 1; 64 channels with 66 % clippings

[2] Measured within 10 kHz bandwidth

CAUTION

This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features

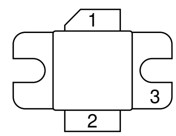
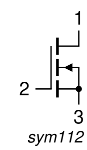
- Excellent back off linearity
- Typical 2-carrier W-CDMA performance at a supply voltage of 28 V and I_{Dq} of 450 mA:
  - Average output power = 6 W
  - Gain = 15 dB
  - Efficiency = 21 %
  - ACPR = –42 dBc (at 3.84 MHz)
  - IMD3 = –38 dBc
- Easy power control
- Excellent ruggedness
- High power gain
- Excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Internally matched for ease of use
- ESD protection

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multicarrier applications in the 2000 MHz to 2200 MHz frequency range
- Broadcast drivers

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	drain		
2	gate		
3	source [1]		

[1] Connected to flange

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF3G22-30	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT608A

4. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions	Min	Max	Unit
V_{DS}	drain-source voltage		-	65	V
V_{GS}	gate-source voltage		-	±15	V
I_D	drain current		-	12	A
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		-	200	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	T_h = 25 °C	[1]	1.85	K/W

[1] Thermal resistance is determined under specified RF operating conditions

6. Characteristics

Table 6. Characteristics

T_j = 25 °C unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.7 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 70 mA	2.0	-	3.0	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 26 V	-	-	1.5	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 9 V; V_{DS} = 10 V	9	-	-	A
I_{GSS}	gate leakage current	V_{GS} = ±15 V; V_{DS} = 0 V	-	-	150	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 3.5 A	-	3	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 6 V; I_D = 2.5 A	-	0.3	-	Ω
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 26 V; f = 1 MHz	-	1.7	-	pF

7. Application information

Table 7. Application information

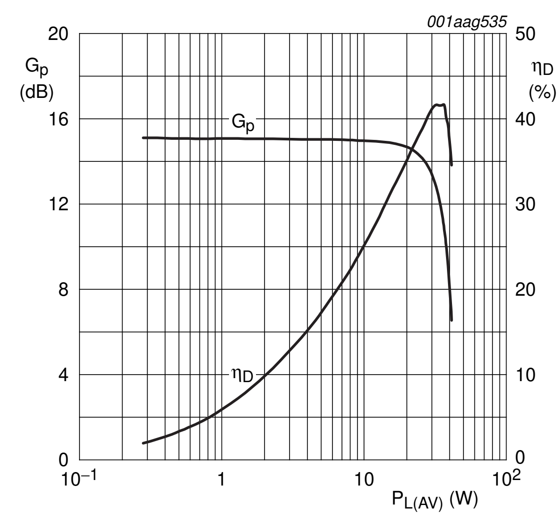
Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Mode of operation: Two-tone CW (100 kHz tone spacing); f = 2170 MHz; I_{Dq} = 450 mA							
G_p	power gain	$P_{L(PEP)}$ = 30 W		-	14	-	dB
RL_{in}	input return loss	$P_{L(PEP)}$ = 30 W		-	–15	-	dB
η_D	drain efficiency	$P_{L(PEP)}$ = 30 W		-	33	-	%
IMD3	third order intermodulation distortion	$P_{L(PEP)}$ = 30 W		-	–24	-	dBc
		$P_{L(PEP)}$ < 6 W		-	< –50	-	dBc
Mode of operation: Two-tone W-CDMA; 3GPP test model 1; 1 - 64 DPCH with 66 % clipping; f_1 = 2115 MHz; f_2 = 2165 MHz; I_{Dq} = 450 mA							
G_p	power gain	$P_{L(AV)}$ = 6 W		13	15	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 6 W		-	–10	–8	dB
η_D	drain efficiency	$P_{L(AV)}$ = 6 W		18	21	-	%
IMD3	third order intermodulation distortion	$P_{L(AV)}$ = 6 W		-	–38	–35	dBc
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 6 W	[1]	-	–42	–38	dBc

[1] Measured within 10 kHz bandwidth.

7.1 Ruggedness in class-AB operation

The BLF3G22-30 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq} = 450 mA; P_L = 30 W (CW); f = 2170 MHz.

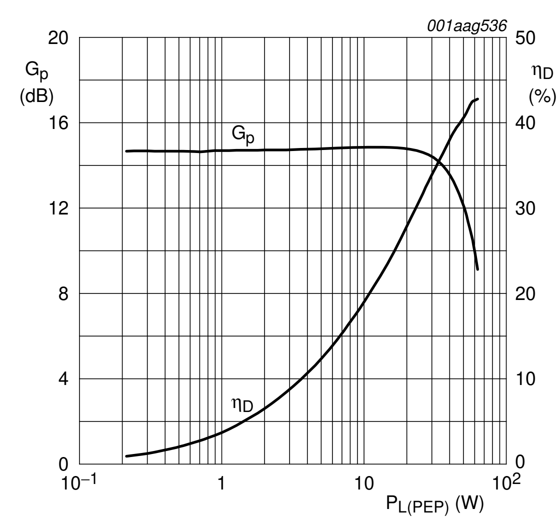
7.2 One-tone



V_{DS} = 28 V; I_{Dq} = 450 mA; T_h = 25 °C; f_1 = 2170 MHz; f_2 = 2170.1 MHz

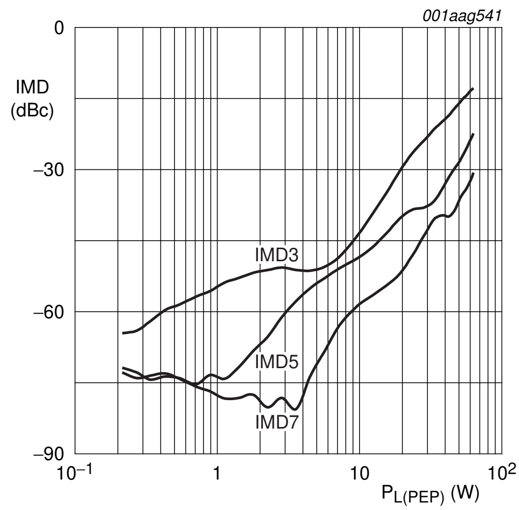
Fig 1. Power gain and drain efficiency as functions of average load power; typical values

7.3 Two-tone



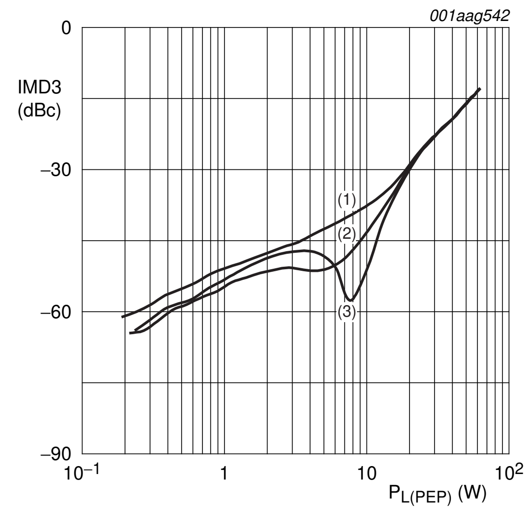
V_{DS} = 28 V; I_{Dq} = 450 mA; T_h = 25 °C; f_1 = 2170 MHz; f_2 = 2170.1 MHz

Fig 2. Power gain and drain efficiency as functions of peak envelope load power; typical values



V_{DS} = 28 V; I_{Dq} = 450 mA; T_h = 25 °C;
f_1 = 2170 MHz; f_2 = 2170.1 MHz

Fig 3. Intermodulation distortion as function of peak envelope load power; typical values



V_{DS} = 28 V; T_h = 25 °C; f_1 = 2170 MHz;
f_2 = 2170.1 MHz

(1) I_{Dq} = 400 mA

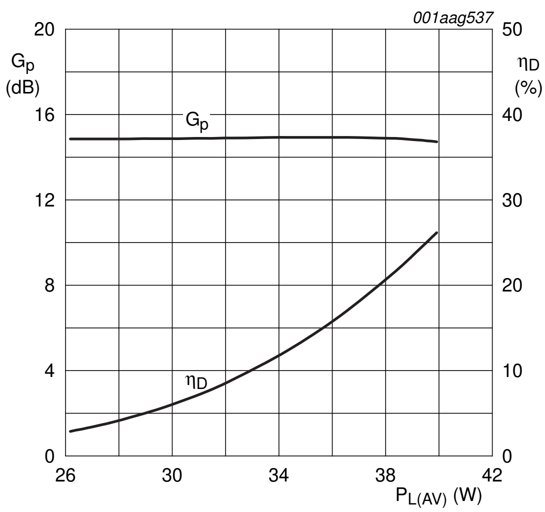
(2) I_{Dq} = 450 mA

(3) I_{Dq} = 500 mA

Fig 4. IMD3 as function of peak envelope load power; typical values

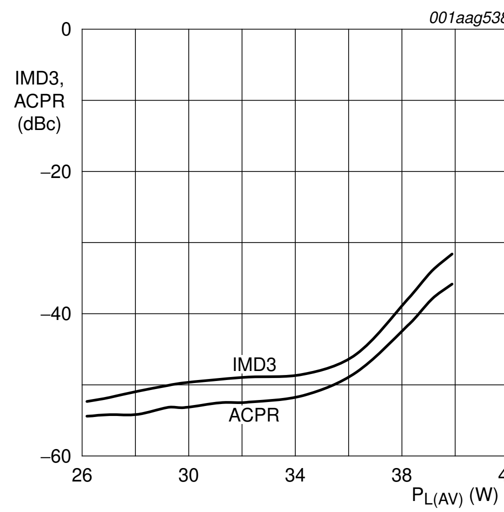
7.4 Two-carrier W-CDMA

Input signals: 3GPP W-CDMA, test model 1, 1-64 DPCH with 66 % clipping; peak-to-average power ratio: 8.5 dB at 0.01 % probability on CCDF; channel spacing = 10 MHz; bandwidth = 3.84 MHz.



V_{DS} = 28 V; I_{Dq} = 450 mA; T_h = 25 °C;
f_1 = 2115 MHz; f_2 = 2165 MHz

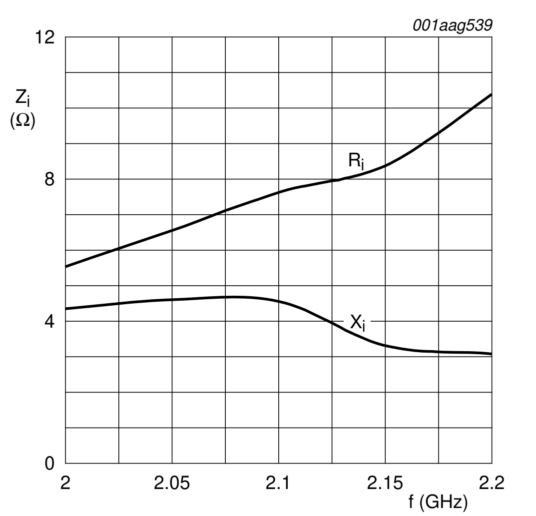
Fig 5. Power gain and drain efficiency as functions of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 450 mA; T_h = 25 °C;
f_1 = 2115 MHz; f_2 = 2165 MHz

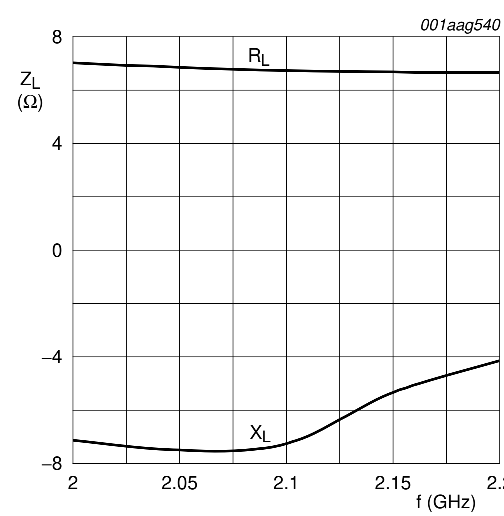
Fig 6. IMD3 and ACPR as functions of average load power; typical values.

7.5 Input impedance and load impedances measured under CW conditions



V_{DS} = 28 V; I_{Dq} = 450 mA; P_L = 30 W; $T_h \leq 25$ °C

Fig 7. Input impedance as function of frequency (series components); typical values



V_{DS} = 28 V; I_{Dq} = 450 mA; P_L = 30 W; $T_h \leq 25$ °C

Fig 8. Load impedance as function of frequency (series components); typical values

8. Test information

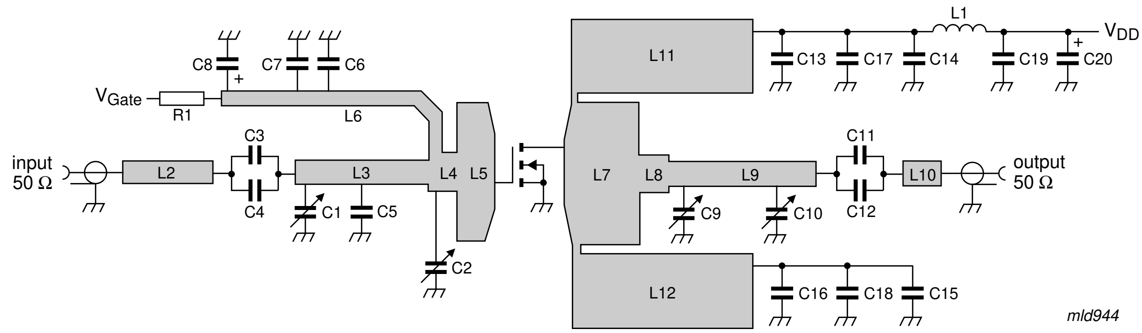
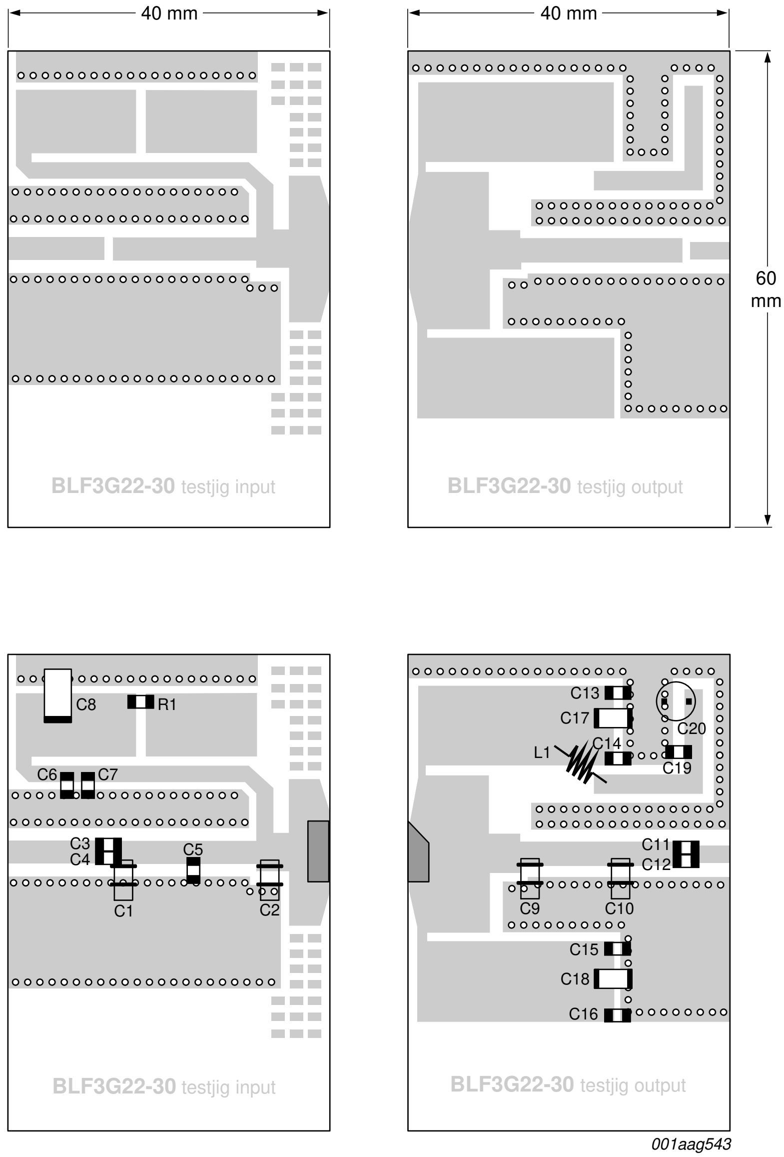


Fig 9. Class-AB test circuit



Dimensions in mm.

The components are situated on one side of the copper-clad Printed-Circuit Board (PCB) with Teflon dielectric (ε_r = 2.2); thickness = 0.79 mm.

The other side is unetched and serves as a ground plane.

See Table 8 for list of components.

Fig 10. Component layout for 2.17 GHz class-AB test circuit

Table 8. List of components (see Figure 9 and Figure 10)

Component	Description		Value	Dimensions	Catalogue No.
C1, C2, C9, C10	Tekelec variable capacitor; type 37271		0.6 pF to 4.5 pF		
C3, C4, C11, C12	multilayer ceramic chip capacitor	[1]	6.8 pF		
C5	multilayer ceramic chip capacitor	[1]	2.2 pF		
C6, C7, C13, C14, C15, C16	multilayer ceramic chip capacitor	[1]	12 pF		
C8	tantalum capacitor		10 μF		
C17, C18	multilayer ceramic chip capacitor		1.5 μF		TDK C3225X7R1H155M
C19	multilayer ceramic chip capacitor	[2]	1 nF		
C20	electrolytic capacitor		100 μF; 63 V		
L1	handmade; enamelled 1 mm copper wire		-	2 loops; 4 mm in diameter	
L2	stripline	[3]	50 Ω	12 mm × 2.4 mm	
L3	stripline	[3]	43 Ω	18 mm × 3 mm	
L4	stripline	[3]	29 Ω	4 mm × 5 mm	
L5	stripline	[3]	10 Ω	5 mm × 18.4 mm	
L6	stripline	[3]	56 Ω	34.4 mm × 2 mm	
L7	stripline	[3]	9 Ω	10 mm × 20 mm	
L8	stripline	[3]	29 Ω	4 mm × 5 mm	
L9	stripline	[3]	41 Ω	20 mm × 3.2 mm	
L10	stripline	[3]	50 Ω	5 mm × 2.4 mm	
L11, L12	stripline	[3]	17 Ω	24.5 mm × 10 mm	

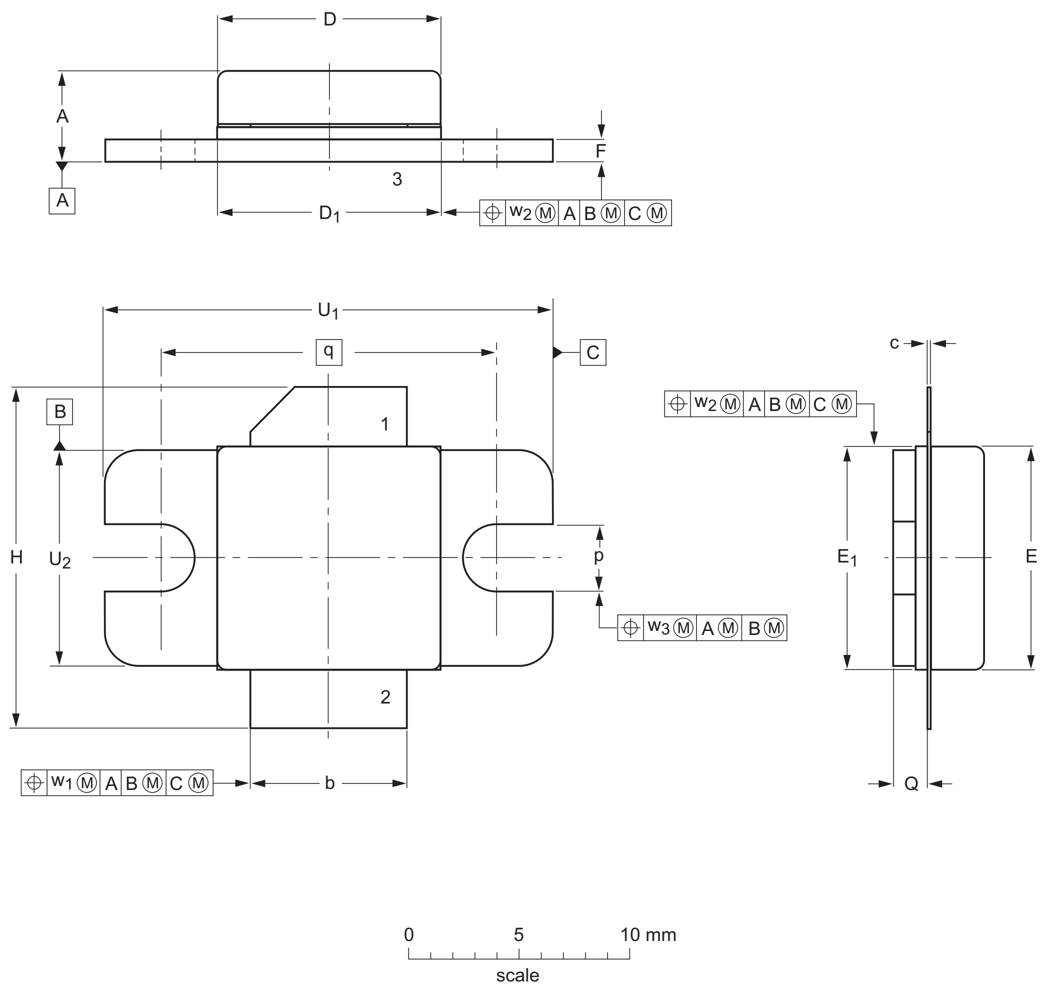
[1] American Technical Ceramics type 100A or capacitor of same quality.

[2] American Technical Ceramics type 100B or capacitor of same quality.

[3] The striplines are on a double copper-clad Printed-Circuit Board (PCB) with Teflon dielectric (ε_r = 2.2); thickness = 0.79 mm.

9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads **SOT608A**



Dimensions (millimetre dimensions are derived from the original inch dimensions)

Unit		A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	max	4.62	7.24	0.15	10.21	10.29	10.21	10.29	1.14	15.37	3.30	1.70		20.45	9.91			
	nom												15.24			0.25	0.25	0.25
	min	3.76	6.99	0.10	10.01	10.03	10.01	10.03	0.89	15.11	2.92	1.45		20.19	9.65			

sot608a_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT608A						~~09-08-26~~ 13-01-29

Fig 11. Package outline SOT608A

10. Abbreviations

Table 9. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
LDMOS	Laterally Diffused Metal Oxide Semiconductor
RF	Radio Frequency
UHF	Ultra High Frequency
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF3G22-30#2	20150901	Product data sheet	-	BLF3G22-30_1
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. • Legal texts have been adapted to the new company name where appropriate.			
BLF3G22-30_1	20070621	Product data sheet	-	-

12. Legal information

12.1 Data sheet status

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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.ampleon.com.

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14. Contents

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