



**THE DATASHEET OF  
BLF7G22LS-100P,112**



# BLF7G22L-100P; BLF7G22LS-100P

Power LDMOS transistor

Rev. 4 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

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

**Table 1. Typical performance**

*Typical RF performance at  $T_{case} = 25\text{ °C}$  in a common source class-AB production test circuit.*

| Test signal      | f<br>(MHz)   | $I_{Dq}$<br>(mA) | $V_{DS}$<br>(V) | $P_{L(AV)}$<br>(W) | $G_p$<br>(dB) | $\eta_D$<br>(%) | ACPR <sub>5M</sub><br>(dBc) |
|------------------|--------------|------------------|-----------------|--------------------|---------------|-----------------|-----------------------------|
| 2-carrier W-CDMA | 2110 to 2170 | 720              | 28              | 20                 | 19.1          | 28.5            | -34 <sup>[1]</sup>          |

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz.

### 1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 2000 MHz to 2200 MHz frequency range

## 2. Pinning information

Table 2. Pinning

| Pin                              | Description | Simplified outline | Graphic symbol                           |
|----------------------------------|-------------|--------------------|--|
| <b>BLF7G22L-100P (SOT1121A)</b>  |             |                    |  |
| 1                                | drain1      |                    | <p style="text-align: right;">sym117</p> |
| 2                                | drain2      |                    |  |
| 3                                | gate1       |                    |  |
| 4                                | gate2       |                    |  |
| 5                                | source      |                    |  |
| <b>BLF7G22LS-100P (SOT1121B)</b> |             |                    |  |
| 1                                | drain1      |                    | <p style="text-align: right;">sym117</p> |
| 2                                | drain2      |                    |  |
| 3                                | gate1       |                    |  |
| 4                                | gate2       |                    |  |
| 5                                | source      |                    |  |

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

| Type number    | Package |   |          |
|----------------|---------|---|----------|
|                | Name    | Description   | Version  |
| BLF7G22L-100P  | -       | flanged LDMOST ceramic package; 2 mounting holes; 4 leads | SOT1121A |
| BLF7G22LS-100P | -       | earless flanged LDMOST ceramic package; 4 leads           | SOT1121B |

## 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  |            | -0.5 | +13  | V    |
| $T_{stg}$ | storage temperature  |            | -65  | +150 | °C   |
| $T_j$     | junction temperature |            | -    | 200  | °C   |

## 5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol        | Parameter                                | Conditions                                   | Typ  | Unit |
|---------------|--|--|------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 20\text{ W}$ | 0.36 | K/W  |

## 6. Characteristics

Table 6. Characteristics

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

| Symbol        | Parameter                        | Conditions  | Min | Typ  | Max | Unit             |
|---------------|----------------------------------|---|-----|------|-----|------------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage   | $V_{GS} = 0\text{ V}; I_D = 0.6\text{ mA}$                  | 65  | 70   | -   | V                |
| $V_{GS(th)}$  | gate-source threshold voltage    | $V_{DS} = 10\text{ V}; I_D = 60\text{ mA}$                  | 1.5 | 2    | 2.3 | V                |
| $I_{DSS}$     | drain leakage current            | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$                 | -   | -    | 2   | $\mu\text{A}$    |
| $I_{DSX}$     | drain cut-off current            | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$ | -   | 12.3 | -   | A                |
| $I_{GSS}$     | gate leakage current             | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$                 | -   | -    | 200 | nA               |
| $g_{fs}$      | forward transconductance         | $V_{DS} = 10\text{ V}; I_D = 60\text{ mA}$                  | -   | 530  | -   | mS               |
| $R_{DS(on)}$  | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 2100\text{ mA}$ | -   | 240  | -   | $\text{m}\Omega$ |

## 7. Test information

Table 7. Functional test information

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1, 1-64 PDPCH;  $f_1 = 2112.5\text{ MHz}; f_2 = 2117.5\text{ MHz}; f_3 = 2162.5\text{ MHz}; f_4 = 2167.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}; T_{case} = 25\text{ °C}$ ; 2 sections combined unless otherwise specified; in a class-AB production test circuit.

| Symbol      | Parameter                            | Conditions                | Min  | Typ  | Max | Unit |
|-------------|--------------------------------------|---------------------------|------|------|-----|------|
| $P_{L(AV)}$ | average output power                 |                           | -    | 20   | -   | W    |
| $G_p$       | power gain                           | $P_{L(AV)} = 20\text{ W}$ | 17.8 | 19.1 | -   | dB   |
| $RL_{in}$   | input return loss                    | $P_{L(AV)} = 20\text{ W}$ | -    | -16  | -9  | dB   |
| $\eta_D$    | drain efficiency                     | $P_{L(AV)} = 20\text{ W}$ | 24   | 28.5 | -   | %    |
| $ACPR_{5M}$ | adjacent channel power ratio (5 MHz) | $P_{L(AV)} = 20\text{ W}$ | -    | -34  | -28 | dBc  |

### 7.1 Ruggedness in class-AB operation

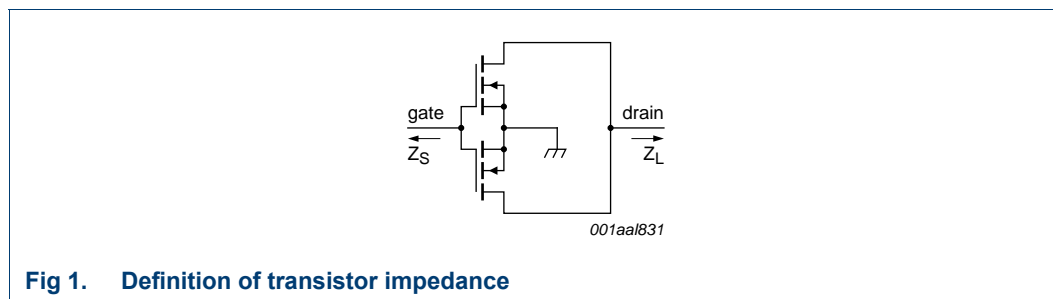
The BLF7G22L-100P and BLF7G22LS-100P are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA}; P_L = 100\text{ W (CW)}; f = 2110\text{ MHz}$ .

## 7.2 Impedance information

**Table 8. Typical push-pull impedance**

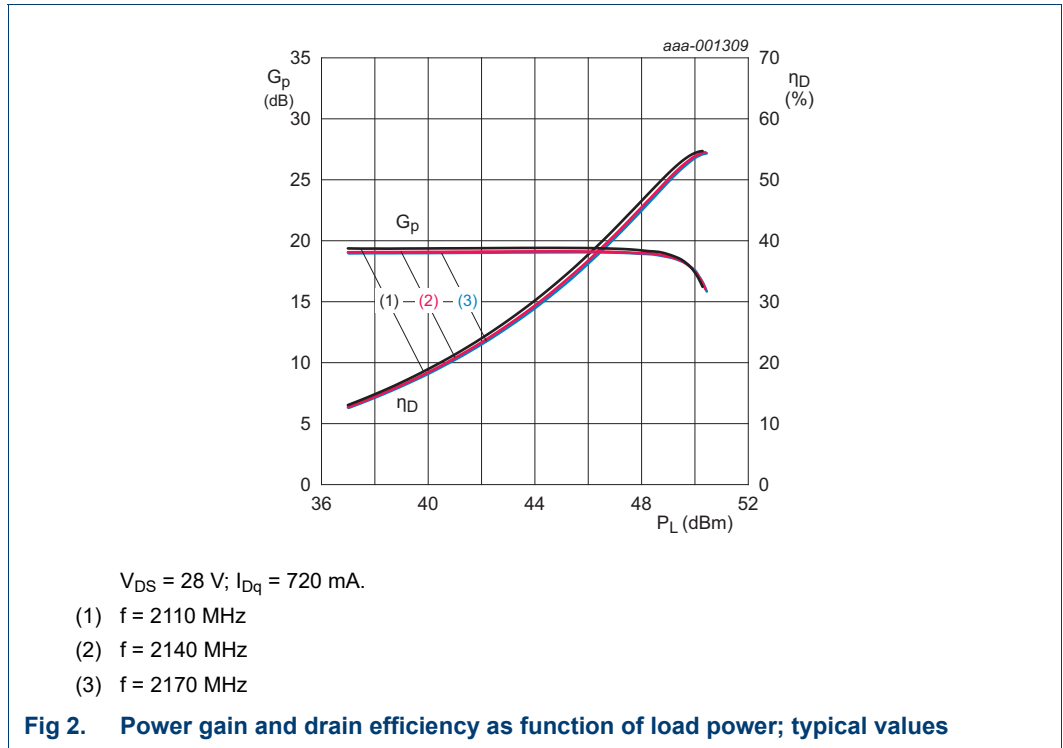
Measured load pull data. Typical values unless otherwise specified.

| <b>f</b><br><b>MHz</b> | <b>Z<sub>S</sub></b><br><b>Ω</b> | <b>Z<sub>L</sub></b><br><b>Ω</b> |
|------------------------|----------------------------------|----------------------------------|
| 2110                   | 1.79 – j4.95                     | 2.27 – j3.64                     |
| 2140                   | 2.37 – j5.49                     | 2.27 – j3.64                     |
| 2170                   | 2.54 – j5.86                     | 1.84 – j3.57                     |

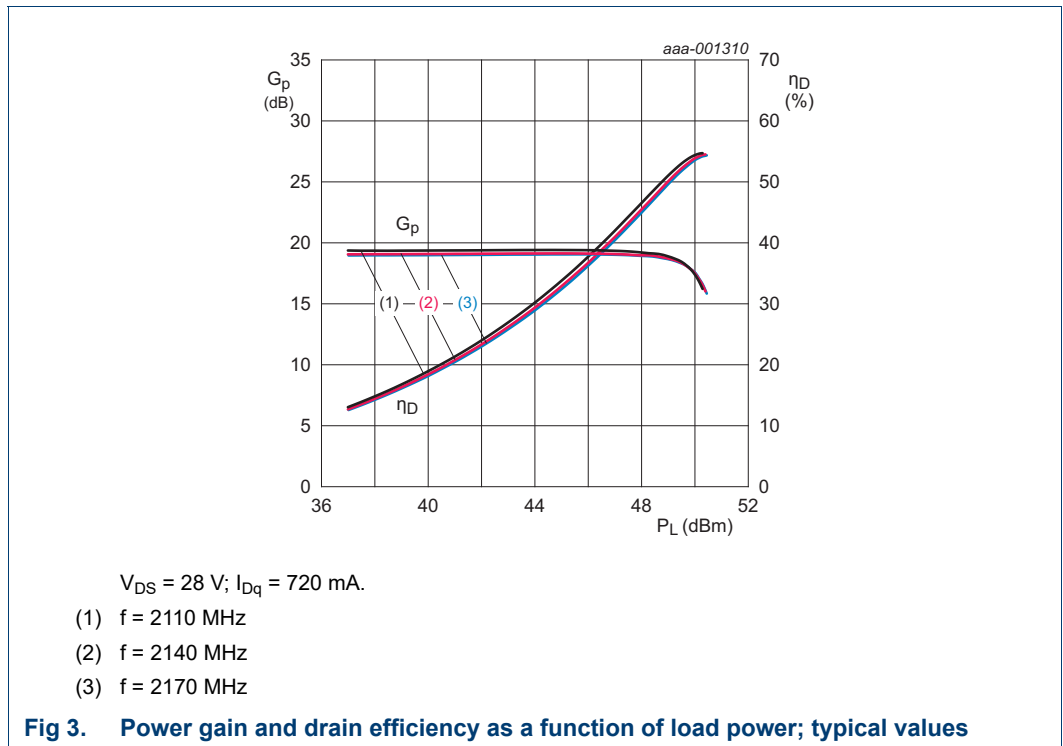


**Fig 1. Definition of transistor impedance**

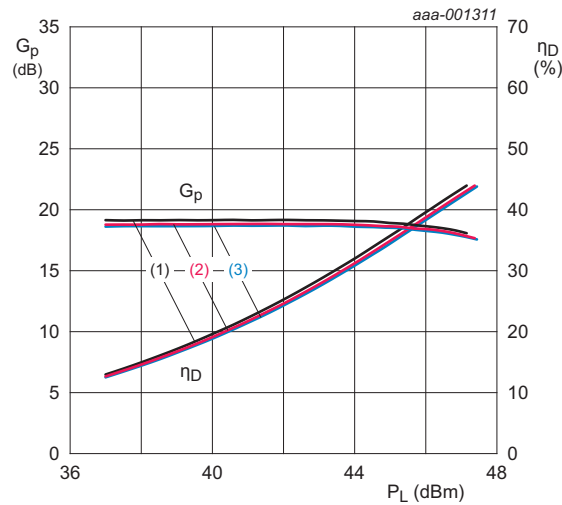
7.3 One Tone CW



7.4 One Tone CW-Pulsed



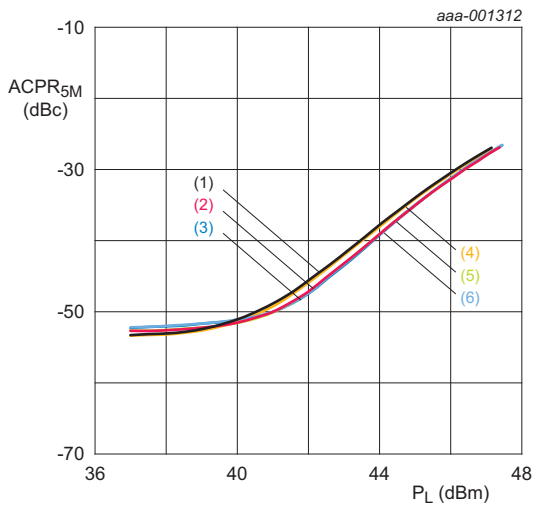
7.5 1-Carrier W-CDMA



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 720\text{ mA}$ .

- (1)  $f = 2110\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$

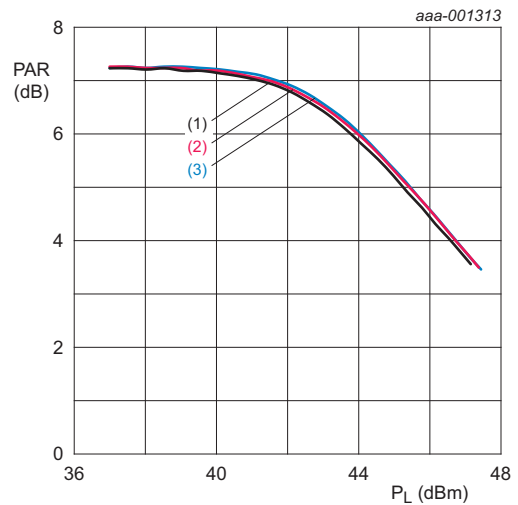
Fig 4. Power gain and drain efficiency as a function of load power; typical values



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 720\text{ mA}$ .

- (1)  $f = 2110\text{ MHz}$ ;  $f + 5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$ ;  $f + 5\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$ ;  $f + 5\text{ MHz}$
- (4)  $f = 2110\text{ MHz}$ ;  $f - 5\text{ MHz}$
- (5)  $f = 2140\text{ MHz}$ ;  $f - 5\text{ MHz}$
- (6)  $f = 2170\text{ MHz}$ ;  $f - 5\text{ MHz}$

Fig 5. Adjacent channel power ratio ( $\pm 5\text{ MHz}$ ) as a function of load power; typical values

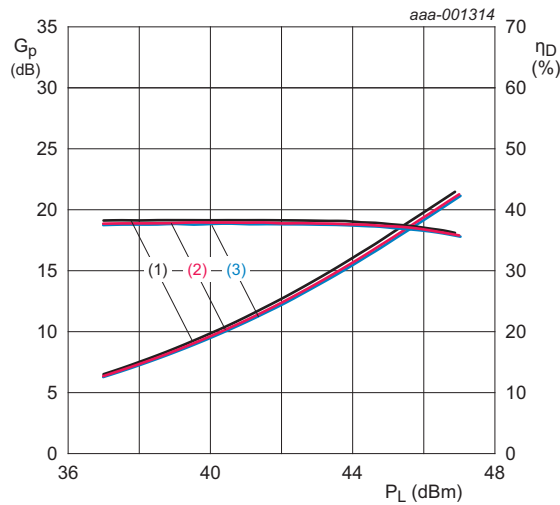


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 720\text{ mA}$ .

- (1)  $f = 2110\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$

Fig 6. Peak-to-average ratio as a function of load power; typical values

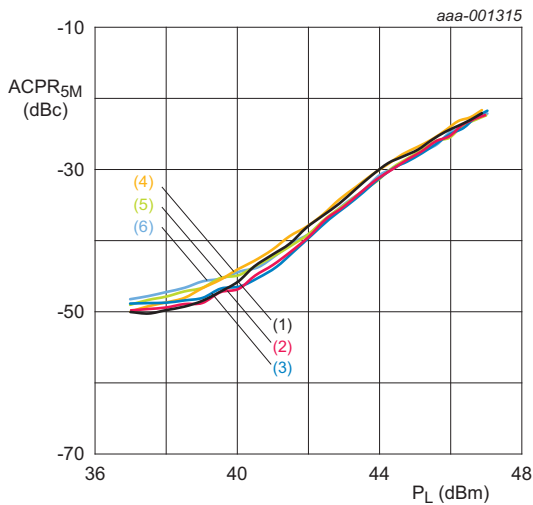
7.6 2-Carrier W-CDMA



$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA.}$

- (1)  $f = 2110\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$

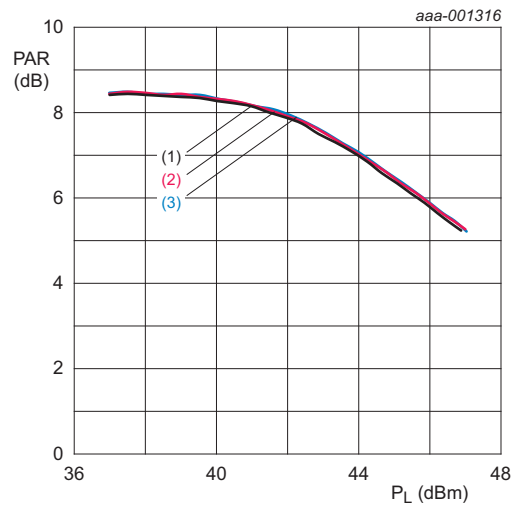
Fig 7. Power gain and drain efficiency as a function of load power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA.}$

- (1)  $f = 2110\text{ MHz}; f + 5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}; f + 5\text{ MHz}$
- (3)  $f = 2170\text{ MHz}; f + 5\text{ MHz}$
- (4)  $f = 2110\text{ MHz}; f - 5\text{ MHz}$
- (5)  $f = 2140\text{ MHz}; f - 5\text{ MHz}$
- (6)  $f = 2170\text{ MHz}; f - 5\text{ MHz}$

Fig 8. Adjacent channel power ratio ( $\pm 5\text{ MHz}$ ) as a function of load power; typical values

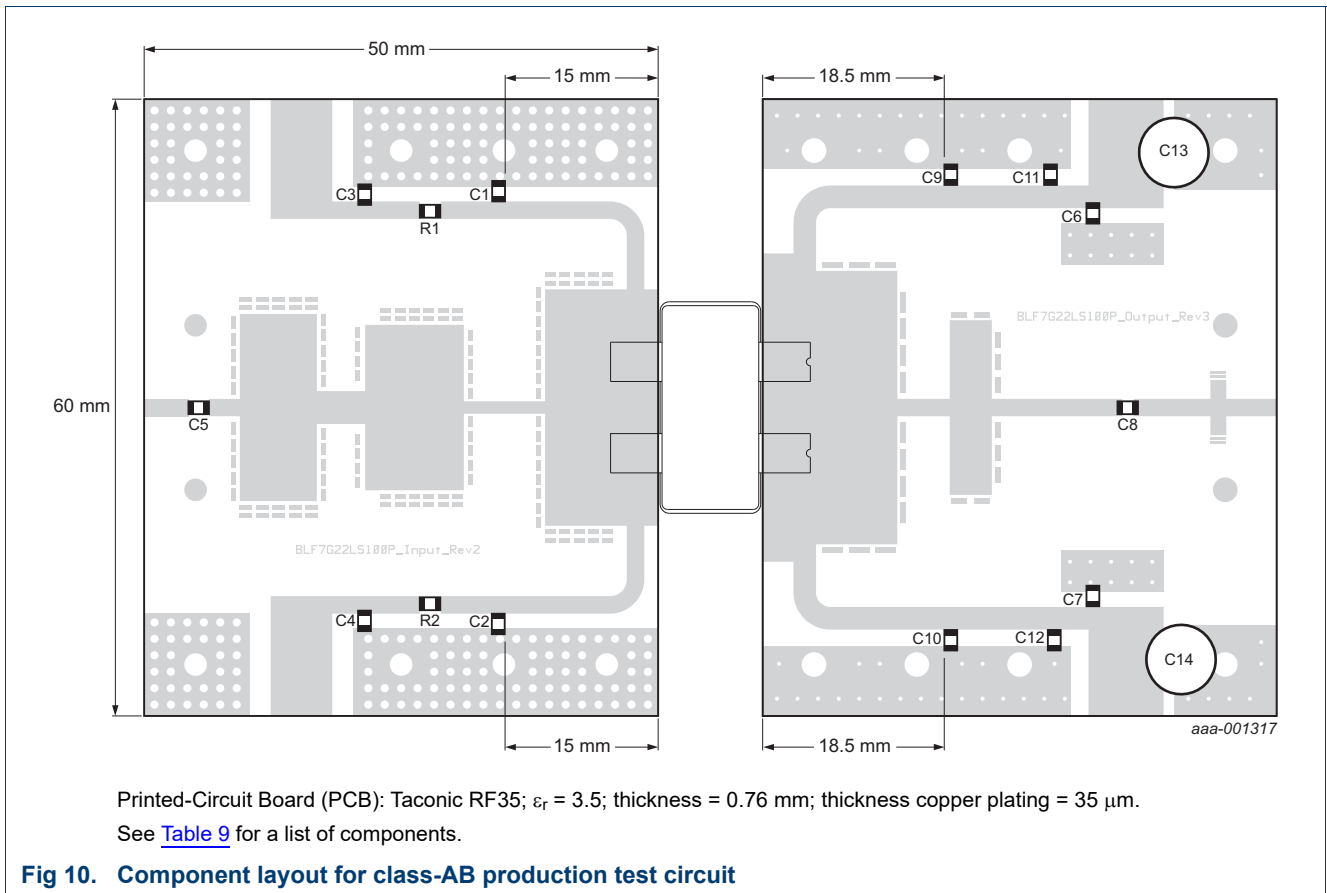


$V_{DS} = 28\text{ V}; I_{Dq} = 720\text{ mA.}$

- (1)  $f = 2110\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2170\text{ MHz}$

Fig 9. Peak-to-average ratio as a function of load power; typical values

7.7 Test circuit



**Table 9. List of components**

For test circuit see [Figure 10](#).

| Component       | Description                       | Value                     | Remarks          |
|-----------------|-----------------------------------|---------------------------|------------------|
| C1, C2, C9, C10 | multilayer ceramic chip capacitor | 8.2 pF                    | [1]              |
| C3, C4, C6, C7  | multilayer ceramic chip capacitor | 1 $\mu\text{F}$           | Murata           |
| C5, C8          | multilayer ceramic chip capacitor | 33 pF                     | [2]              |
| C11, C12        | multilayer ceramic chip capacitor | 0.1 $\mu\text{F}$         | Murata           |
| C13, C14        | electrolytic capacitor            | 1000 $\mu\text{F}$ ; 50 V |                  |
| R1, R2          | Chip resistor                     | 5.1 $\Omega$              | Vishay Dale 0805 |

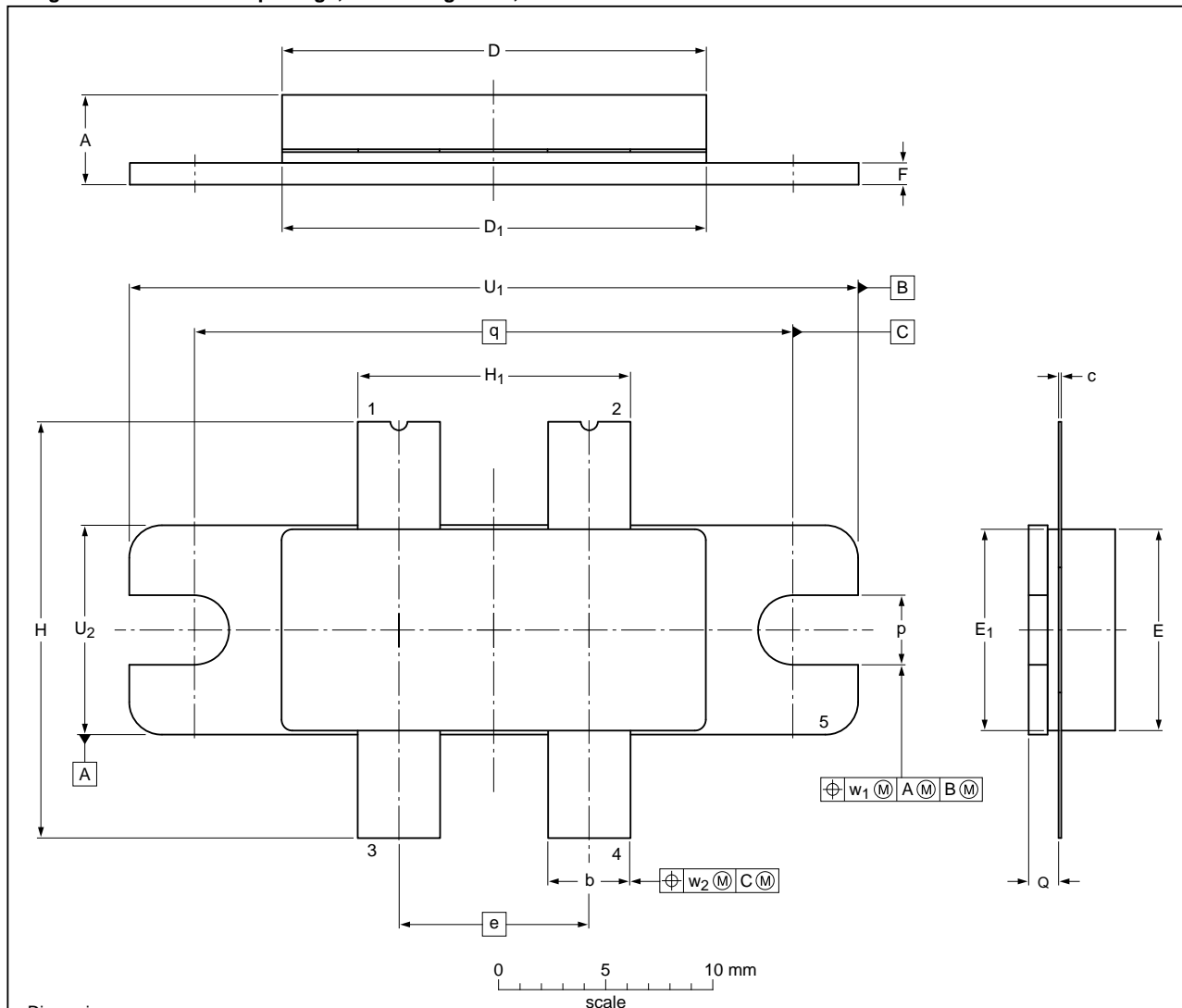
[1] American Technical Ceramics type 100A or capacitor of same quality.

[2] American Technical Ceramics type 800B or capacitor of same quality.

### 8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 4 leads

SOT1121A



Dimensions

| Unit <sup>(1)</sup> | A   | b     | c     | D     | D <sub>1</sub> | e     | E     | E <sub>1</sub> | F     | H     | H <sub>1</sub> | p     | Q <sup>(2)</sup> | q     | U <sub>1</sub> | U <sub>2</sub> | w <sub>1</sub> | w <sub>2</sub> |
|---------------------|-----|-------|-------|-------|----------------|-------|-------|----------------|-------|-------|----------------|-------|------------------|-------|----------------|----------------|----------------|----------------|
| mm                  | max | 4.75  | 3.94  | 0.18  | 20.02          | 19.96 | 9.53  | 9.53           | 1.14  | 19.94 | 12.83          | 3.38  | 1.70             | 34.16 | 9.91           |                | 0.25           | 0.51           |
|                     | nom |       |       |       |                | 8.89  |       |                |       |       |                |       | 27.94            |       |                |                |                |                |
|                     | min | 3.45  | 3.68  | 0.10  | 19.61          | 19.66 | 9.27  | 9.27           | 0.89  | 18.92 | 12.57          | 3.12  | 1.45             | 33.91 | 9.65           |                |                |                |
| inches              | max | 0.187 | 0.155 | 0.007 | 0.788          | 0.786 | 0.375 | 0.375          | 0.045 | 0.785 | 0.505          | 0.133 | 0.067            | 1.345 | 0.39           |                | 0.01           | 0.02           |
|                     | nom |       |       |       |                | 0.35  |       |                |       |       |                |       | 1.1              |       |                |                |                |                |
|                     | min | 0.136 | 0.145 | 0.004 | 0.772          | 0.774 | 0.365 | 0.365          | 0.035 | 0.745 | 0.495          | 0.123 | 0.057            | 1.335 | 0.38           |                |                |                |

Note

- 1. millimeter dimensions are derived from the original inch dimensions.
- 2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1121a\_po

| Outline version | References |       |       | European projection | Issue date           |
|-----------------|------------|-------|-------|---------------------|----------------------|
|                 | IEC        | JEDEC | JEITA |                     |                      |
| SOT1121A        |            |       |       |                     | 09-10-12<br>10-02-02 |

Fig 11. Package outline SOT1121A

Earless flanged ceramic package; 4 leads

SOT1121B

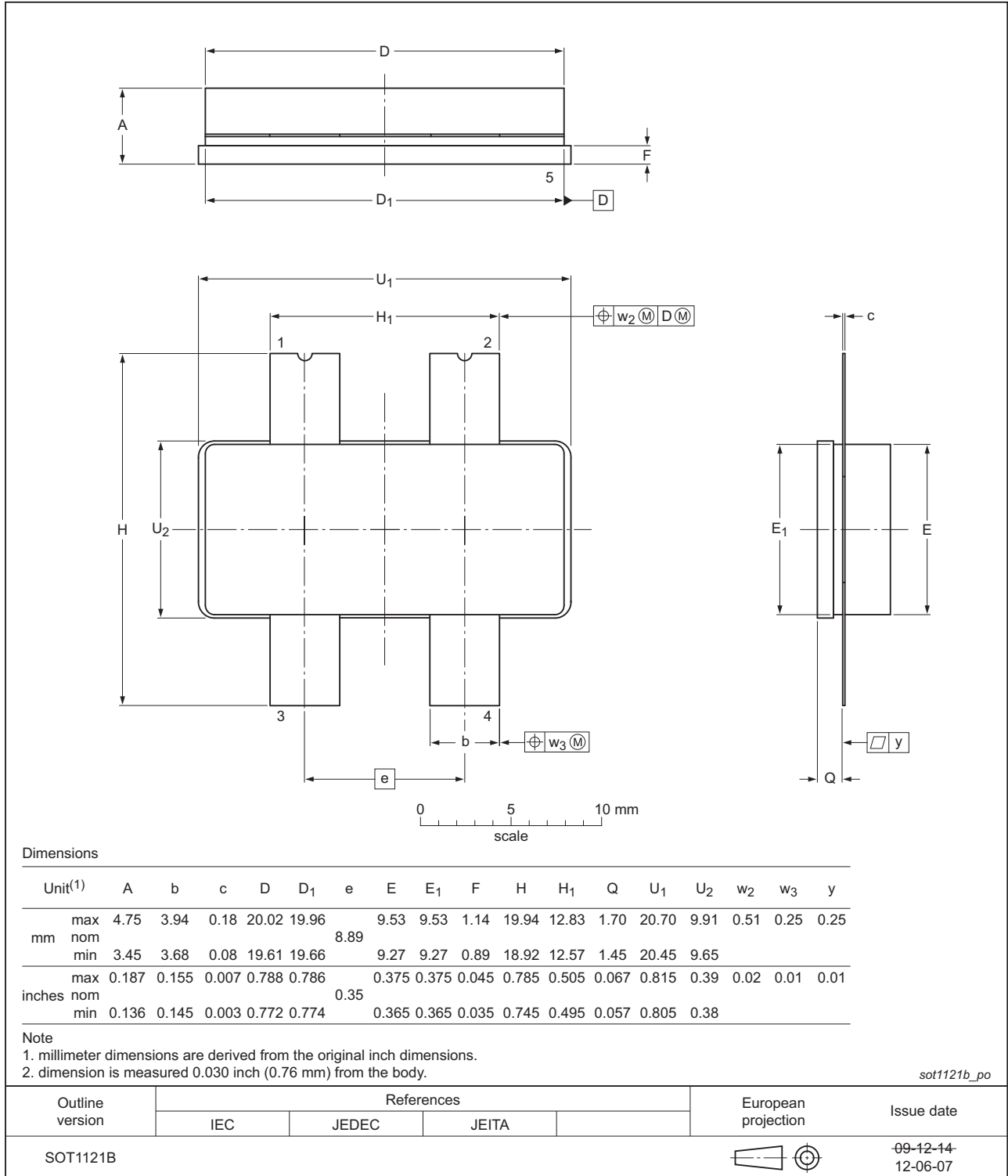


Fig 12. Package outline SOT1121B

## 9. Abbreviations

Table 10. Abbreviations

| Acronym | Description   |
|---------|---|
| 3GPP    | Third Generation Partnership Project                    |
| CCDF    | Complementary Cumulative Distribution Function          |
| CW      | Continuous Wave   |
| DPCH    | Dedicated Physical Channel                              |
| ESD     | ElectroStatic Discharge                                 |
| LDMOS   | Laterally Diffused Metal Oxide Semiconductor            |
| LDMOST  | Laterally Diffused Metal Oxide Semiconductor Transistor |
| PAR     | Peak-to-Average power Ratio                             |
| PDPCH   | Transmission Power of Dedicated Physical Channel        |
| RF      | Radio Frequency   |
| VSWR    | Voltage Standing Wave Ratio                             |
| W-CDMA  | Wideband Code Division Multiple Access                  |

## 10. Revision history

Table 11. Revision history

| Document ID                      | Release date   | Data sheet status      | Change notice | Supersedes                       |
|----------------------------------|--|------------------------|---------------|----------------------------------|
| BLF7G22L-100P_BLF7G22LS-100P#4   | 20150901   | Product data sheet     | -             | BLF7G22L-100P_BLF7G22LS-100P v.3 |
| Modifications:                   | <ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul> |                        |               |                                  |
| BLF7G22L-100P_BLF7G22LS-100P v.3 | 20120102   | Product data sheet     | -             | BLF7G22L-100P_BLF7G22LS-100P v.2 |
| BLF7G22L-100P_BLF7G22LS-100P v.2 | 20111110   | Preliminary data sheet | -             | BLF7G22L-100P_BLF7G22LS-100P v.1 |
| BLF7G22L-100P_BLF7G22LS-100P v.1 | 20110519   | Objective data sheet   | -             | -                                |

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### 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. |
| 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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