

# ANTREX Electronics

## Electronic Components Sourcing Information

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### Product Reference Information

|                      |                           |
|----------------------|---------------------------|
| <b>Part Number:</b>  | BLF7G22LS-130,112         |
| <b>Manufacturer:</b> | Ampleon USA Inc.          |
| <b>Package:</b>      | Please confirm with sales |
| <b>Availability:</b> | Please confirm with sales |

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#### Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

# BLF7G22L-130; BLF7G22LS-130

Power LDMOS transistor

Rev. 5 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

130 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.*

| Mode of operation | f<br>(MHz)   | $I_{DQ}$<br>(mA) | $V_{DS}$<br>(V) | $P_{L(AV)}$<br>(W) | $G_p$<br>(dB) | $\eta_D$<br>(%) | ACPR<br>(dBc)      |
|-------------------|--------------|------------------|-----------------|--------------------|---------------|-----------------|--------------------|
| 2-carrier W-CDMA  | 2110 to 2170 | 950              | 28              | 30                 | 18.5          | 32              | -32 <sup>[1]</sup> |
| 1-carrier W-CDMA  | 2110 to 2170 | 950              | 28              | 33                 | 18.5          | 33              | -39 <sup>[2]</sup> |

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

[2] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF.

### 1.2 Features and benefits

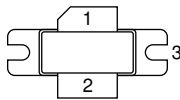
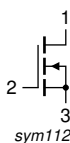
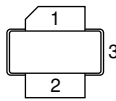
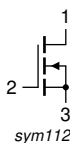
- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent digital pre-distortion capability
- 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                                                                      |
|-------------------------|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| BLF7G22L-130 (SOT502A)  |             |                                                                                     |                                                                                     |
| 1                       | drain       |  |  |
| 2                       | gate        |                                                                                     |                                                                                     |
| 3                       | source      |                                                                                     |                                                                                     |
| BLF7G22LS-130 (SOT502B) |             |                                                                                     |                                                                                     |
| 1                       | drain       |  |  |
| 2                       | gate        |                                                                                     |                                                                                     |
| 3                       | source      |                                                                                     |                                                                                     |

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

| Type number   | Package |                                                           |         |
|---------------|---------|-----------------------------------------------------------|---------|
|               | Name    | Description                                               | Version |
| BLF7G22L-130  | -       | flanged LDMOST ceramic package; 2 mounting holes; 2 leads | SOT502A |
| BLF7G22LS-130 | -       | earless flanged LDMOST ceramic package; 2 leads           | SOT502B |

## 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    |
| $I_D$     | drain current        |            | -    | 28   | A    |
| $T_{stg}$ | storage temperature  |            | -65  | +150 | °C   |
| $T_j$     | junction temperature |            | -    | 225  | °C   |

## 5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol        | Parameter                                | Conditions                                                    | Typ  | Unit |
|---------------|------------------------------------------|---------------------------------------------------------------|------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ }^{\circ}\text{C}$ ; $P_L = 30\text{ W}$ | 0.35 | K/W  |

## 6. Characteristics

Table 6. Characteristics

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

| Symbol        | Parameter                        | Conditions                                                        | Min | Typ  | Max  | Unit          |
|---------------|----------------------------------|-------------------------------------------------------------------|-----|------|------|---------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage   | $V_{GS} = 0\text{ V}$ ; $I_D = 1.5\text{ mA}$                     | 65  | -    | -    | V             |
| $V_{GS(th)}$  | gate-source threshold voltage    | $V_{DS} = 10\text{ V}$ ; $I_D = 150\text{ mA}$                    | 1.3 | 1.8  | 2.3  | V             |
| $I_{DSS}$     | drain leakage current            | $V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$                    | -   | -    | 5    | $\mu\text{A}$ |
| $I_{DSX}$     | drain cut-off current            | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ;<br>$V_{DS} = 10\text{ V}$ | 25  | 29.5 | -    | A             |
| $I_{GSS}$     | gate leakage current             | $V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$                    | -   | -    | 450  | nA            |
| $g_{fs}$      | forward transconductance         | $V_{DS} = 10\text{ V}$ ; $I_D = 7.5\text{ A}$                     | -   | 10   | 11   | S             |
| $R_{DS(on)}$  | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ;<br>$I_D = 5.25\text{ A}$  | -   | 0.1  | 0.16 | $\Omega$      |

## 7. Test information

Table 7. Functional test information

Mode of operation: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 64 DPCH;  $f_1 = 2112.5\text{ MHz}$ ;  $f_2 = 2117.5\text{ MHz}$ ;  $f_3 = 2162.5\text{ MHz}$ ;  $f_4 = 2167.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 950\text{ mA}$ ;  $T_{case} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

| Symbol      | Parameter                    | Conditions                | Min | Typ  | Max | Unit |
|-------------|------------------------------|---------------------------|-----|------|-----|------|
| $P_{L(AV)}$ | average output power         |                           | -   | 30   | -   | W    |
| $G_p$       | power gain                   | $P_{L(AV)} = 30\text{ W}$ | 17  | 18.5 | -   | dB   |
| $RL_{in}$   | input return loss            | $P_{L(AV)} = 30\text{ W}$ | -   | -15  | -9  | dB   |
| $\eta_D$    | drain efficiency             | $P_{L(AV)} = 30\text{ W}$ | 29  | 32   | -   | %    |
| ACPR        | adjacent channel power ratio | $P_{L(AV)} = 30\text{ W}$ | -   | -31  | -28 | dBc  |

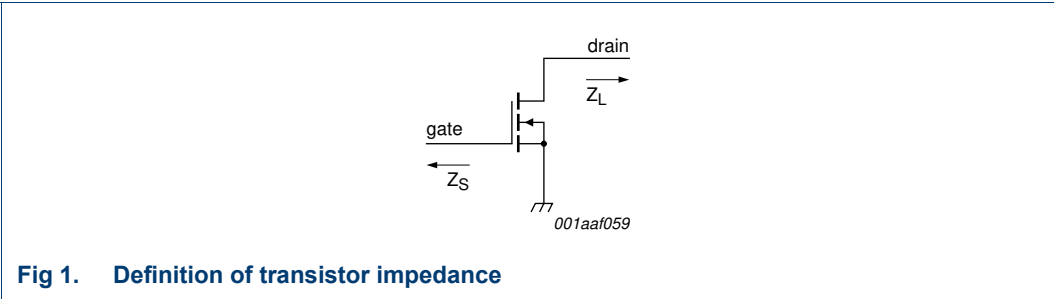
### 7.1 Ruggedness in class-AB operation

The BLF7G22L-130 and BLF7G22LS-130 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 950\text{ mA}$ ;  $P_L = 130\text{ W (CW)}$ ;  $f = 2110\text{ MHz}$ .

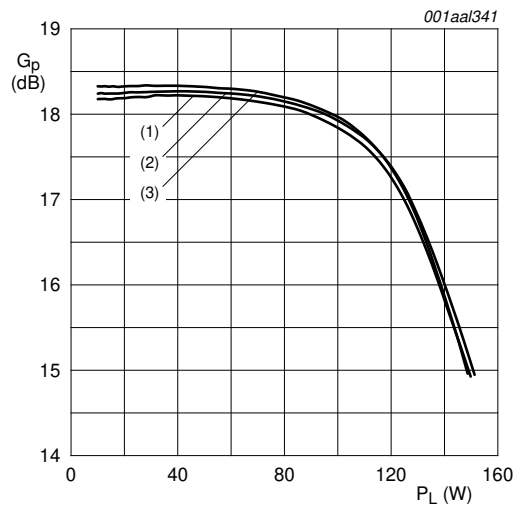
7.2 Impedance information

Table 8. Typical impedance information  
 $I_{DQ} = 950\text{ mA}$ ; main transistor  $V_{DS} = 28\text{ V}$ .  
 $Z_S$  and  $Z_L$  defined in [Figure 1](#).

| f<br>(MHz) | $Z_S$<br>( $\Omega$ ) | $Z_L$<br>( $\Omega$ ) |
|------------|-----------------------|-----------------------|
| 2050       | $1.3 - j3.6$          | $2.2 - j2.6$          |
| 2140       | $1.9 - j4.2$          | $2.0 - j2.6$          |
| 2230       | $3.1 - j4.7$          | $1.9 - j2.8$          |



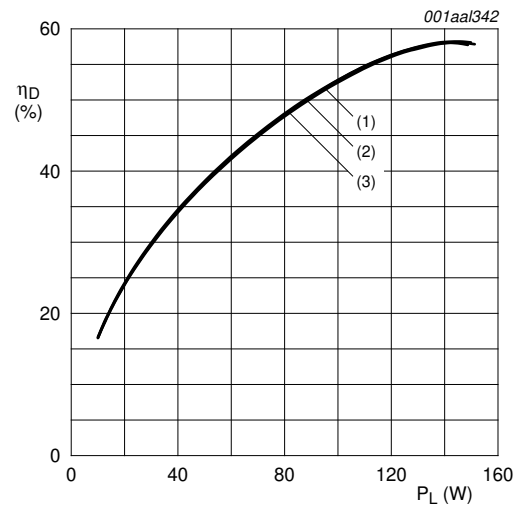
### 7.3 1 Tone CW



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2110$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2170$  MHz

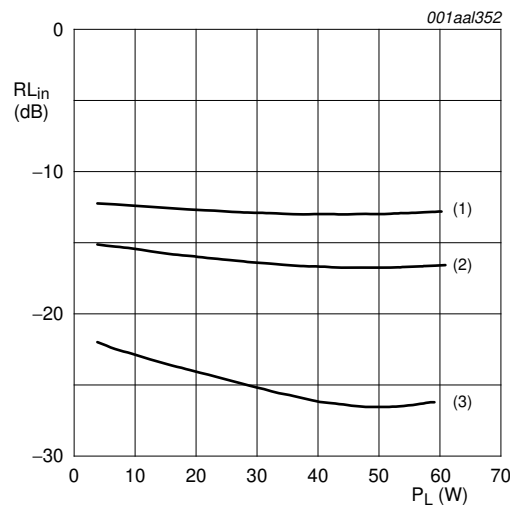
**Fig 2. Power gain as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2110$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2170$  MHz

**Fig 3. Drain efficiency as a function of load power; typical values**



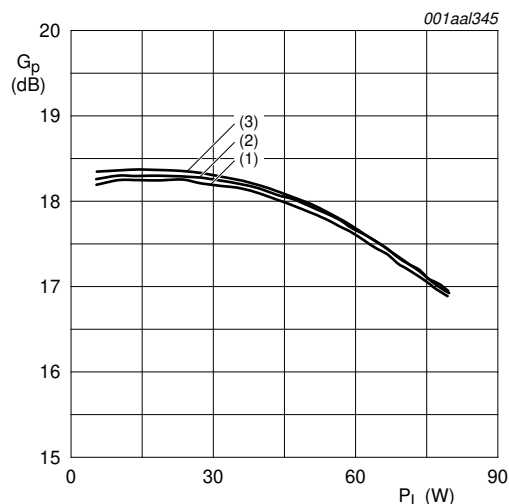
$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2110$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2170$  MHz

**Fig 4. Input return loss as a function of load power; typical values**

## 7.4 1-carrier W-CDMA

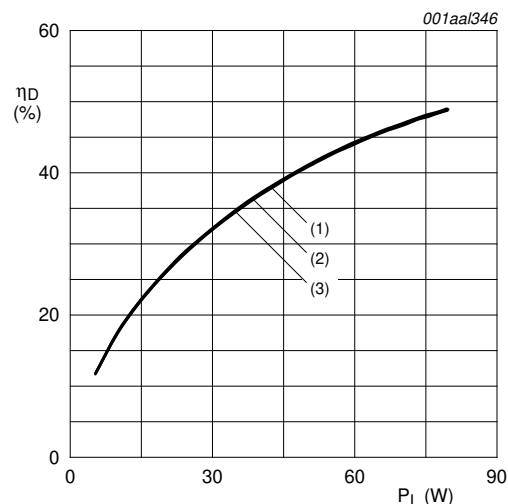
Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF.



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2112.5$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2167.5$  MHz

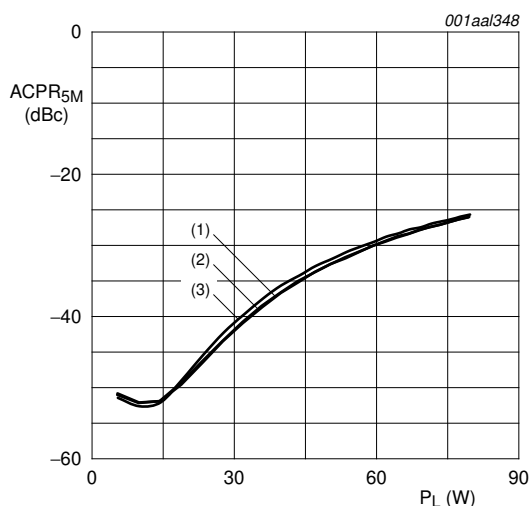
**Fig 5. Power gain as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2112.5$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2167.5$  MHz

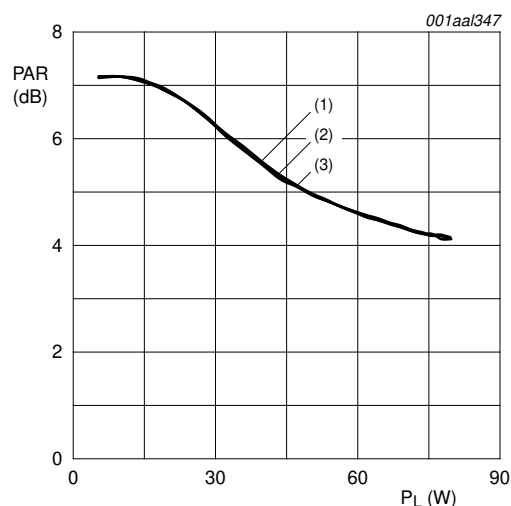
**Fig 6. Drain efficiency as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2112.5$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2167.5$  MHz

**Fig 7. Adjacent channel power ratio (5MHz) as a function of load power; typical values**



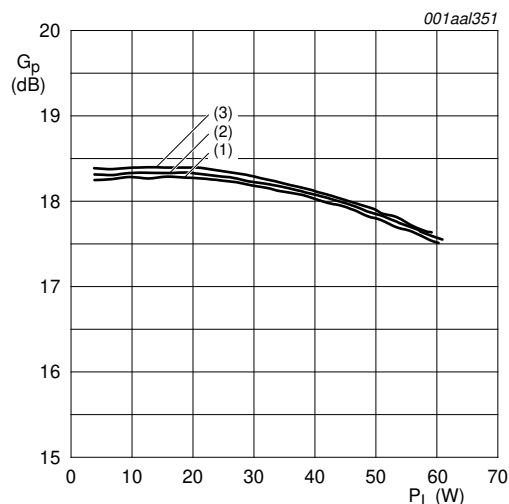
$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA.

- (1)  $f = 2112.5$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2167.5$  MHz

**Fig 8. Peak-to-average power ratio as a function of load power; typical values**

## 7.5 2-carrier W-CDMA (5 MHz carrier spacing)

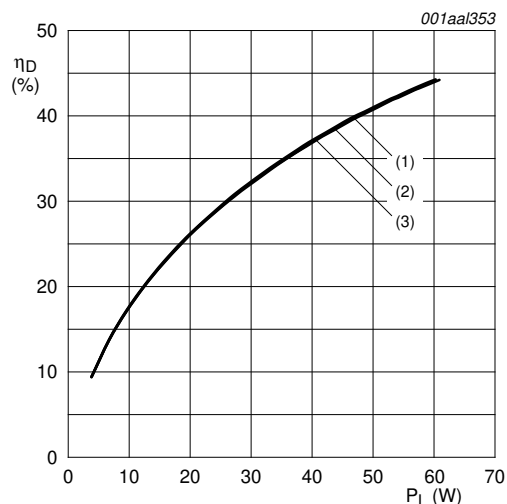
Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF.



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA; carrier spacing 5 MHz.

- (1)  $f = 2115$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2165$  MHz

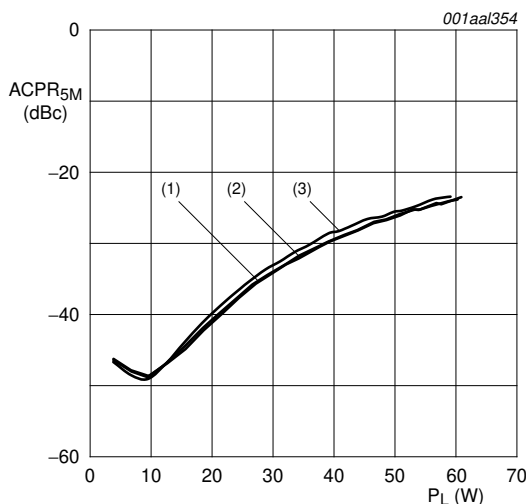
**Fig 9. Power gain as a function of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA; carrier spacing 5 MHz.

- (1)  $f = 2115$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2165$  MHz

**Fig 10. drain efficiency as a function of load power; typical values**



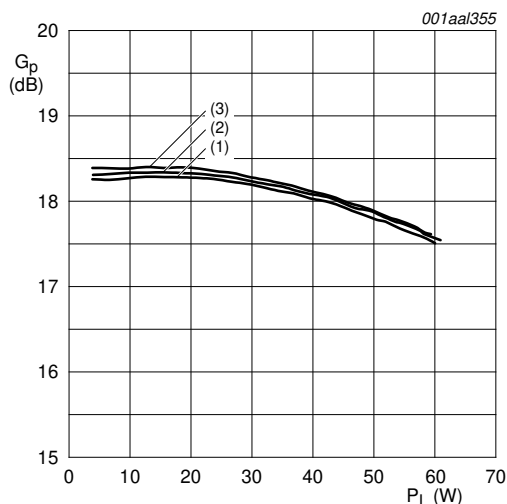
$V_{DS} = 28$  V;  $I_{Dq} = 950$  mA; carrier spacing 5 MHz.

- (1)  $f = 2115$  MHz
- (2)  $f = 2140$  MHz
- (3)  $f = 2165$  MHz

**Fig 11. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**

## 7.6 2-carrier W-CDMA (10 MHz carrier spacing)

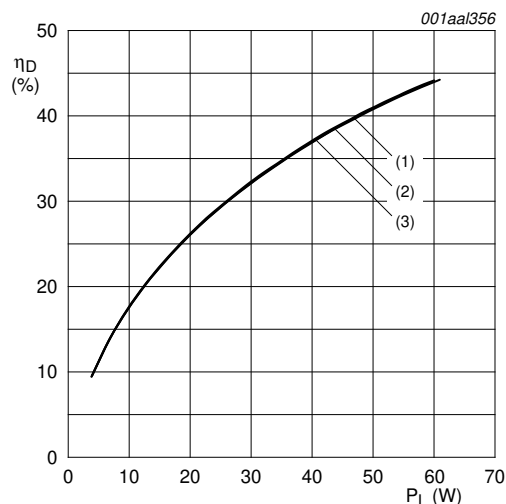
Test signal: 3GPP; test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF.



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 950\text{ mA}$ ; carrier spacing 10 MHz.

- (1)  $f = 2117.5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2162.5\text{ MHz}$

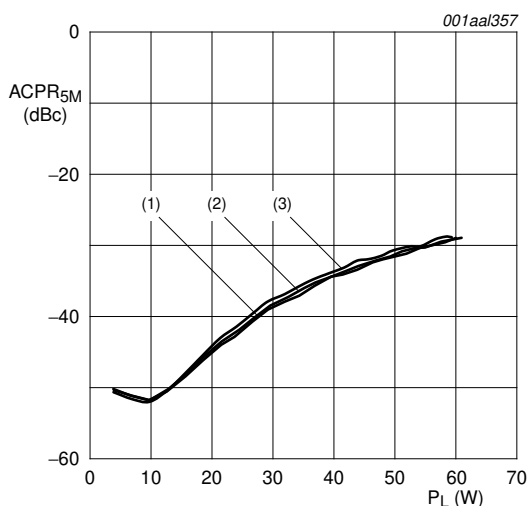
**Fig 12. Power gain as a function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 950\text{ mA}$ ; carrier spacing 10 MHz.

- (1)  $f = 2117.5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2162.5\text{ MHz}$

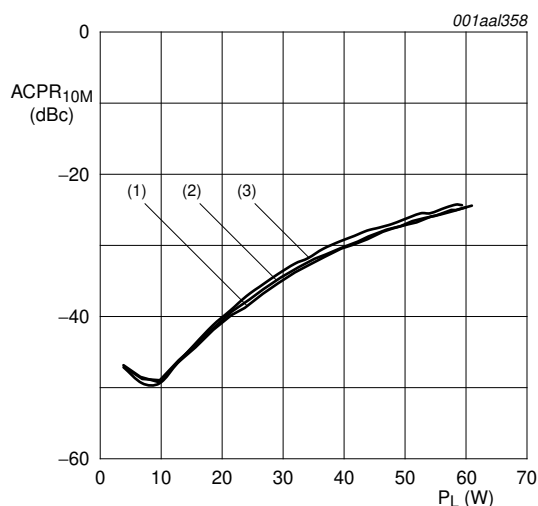
**Fig 13. Drain efficiency as a function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 950\text{ mA}$ ; carrier spacing 10 MHz.

- (1)  $f = 2117.5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2162.5\text{ MHz}$

**Fig 14. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**

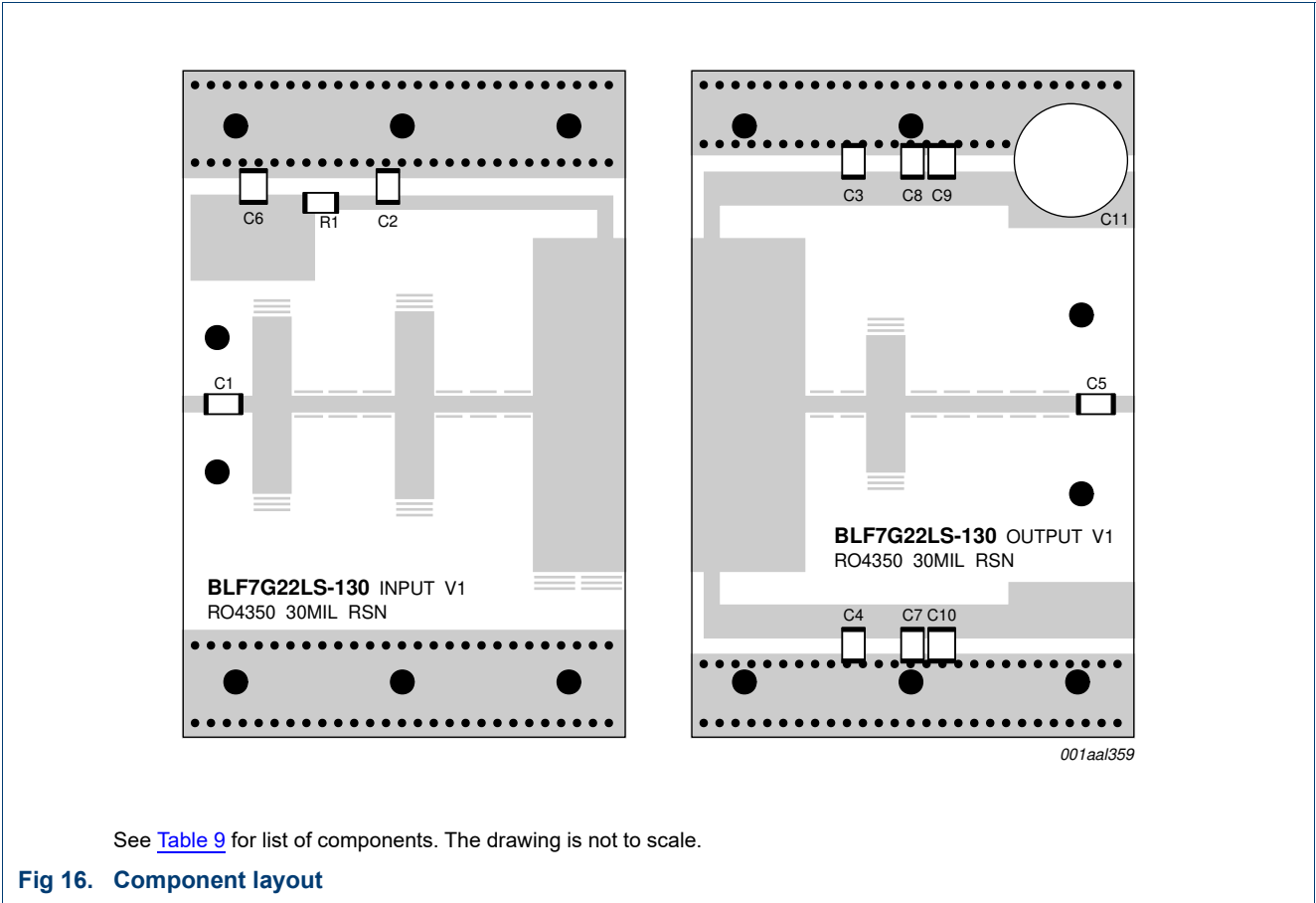


$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 950\text{ mA}$ ; carrier spacing 10 MHz.

- (1)  $f = 2117.5\text{ MHz}$
- (2)  $f = 2140\text{ MHz}$
- (3)  $f = 2162.5\text{ MHz}$

**Fig 15. Adjacent channel power ratio (10 MHz) as a function of load power; typical values**

7.7 Test circuit



**Table 9. List of components**  
See [Figure 16](#) for component layout.

| Component          | Description                       | Value             | Remarks      |
|--------------------|-----------------------------------|-------------------|--------------|
| C1, C2, C3, C4, C5 | multilayer ceramic chip capacitor | 9.1 pF            | ATC100B      |
| C6, C7             | multilayer ceramic chip capacitor | 220 nF            | AVX1206      |
| C8, C9, C10        | multilayer ceramic chip capacitor | 4.7 $\mu$ F; 50 V | Kemet        |
| C11                | electrolytic capacitor            | 220 $\mu$ F; 63 V | BC           |
| R1                 | SMD resistor                      | 6.2 $\Omega$      | Philips 1206 |

8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT502A

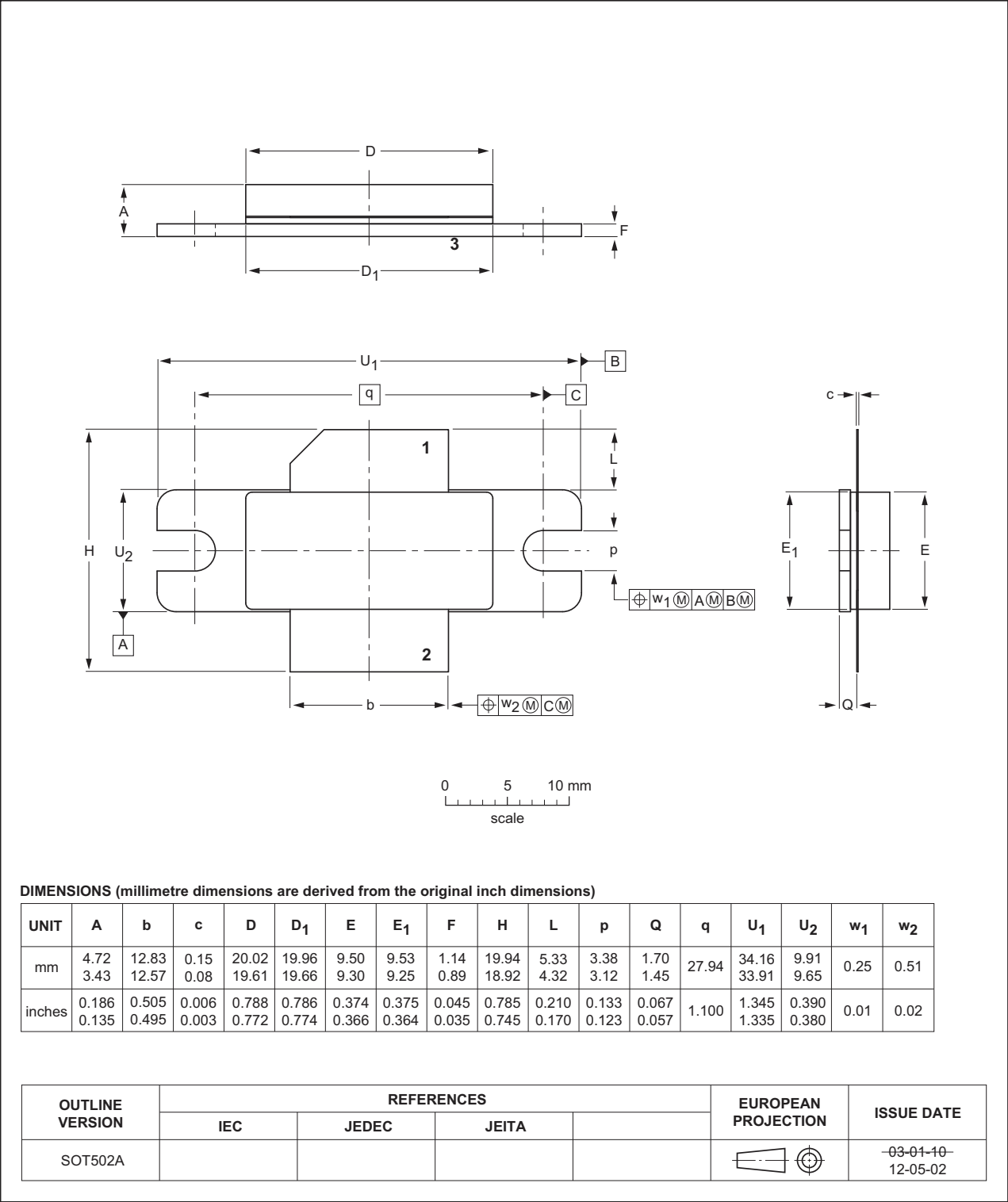


Fig 17. Package outline SOT502A

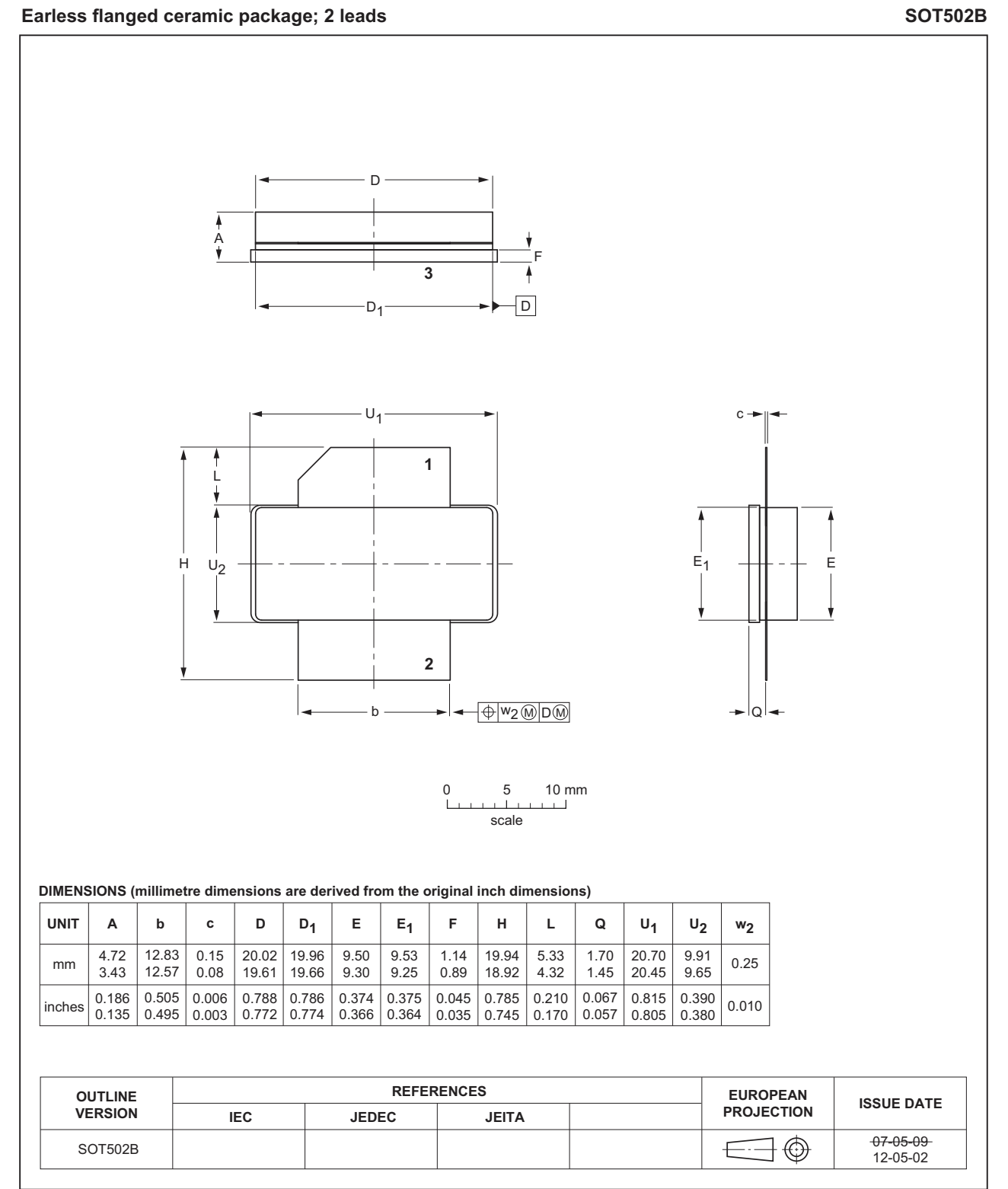


Fig 18. Package outline SOT502B

## 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                             |
| RF      | Radio Frequency                                         |
| SMD     | Surface Mounted Device                                  |
| 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-130_7G22LS-130#5   | 20150901                                                                                                                                                                                                                                   | Product data sheet | -             | BLF7G22L-130_7G22LS-130 v.4 |
| 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-130_7G22LS-130 v.4 | 20110120                                                                                                                                                                                                                                   | Product data sheet | -             | BLF7G22LS-130 v.3           |
| BLF7G22L-130_7G22LS-130 v.3 | 20101118                                                                                                                                                                                                                                   | Product data sheet | -             | BLF7G22LS-130 v.2           |
| BLF7G22L-130_7G22LS-130 v.2 | 20101004                                                                                                                                                                                                                                   | Product data sheet | -             | BLF7G22LS-130 v.1           |
| BLF7G22LS-130 v.1           | 20100202                                                                                                                                                                                                                                   | Product 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. |
| 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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## 12. Contact information

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