BLC6G22-75; BLC6G22LS-75

Power LDMOS transistor

Rev. 01 — 7 February 2008

Objective data sheet

1. Product profile

1.1 General description

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

Table 1. Typical performance

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

| Mode of operation | f | V _{DS} | P _{L(AV)} | Gp | η _D | IMD3 | ACPR |
|-------------------|--------------|-----------------|--------------------|------|----------------|----------------------|---------------------|
| | (MHz) | (V) | (W) | (dB) | (%) | (dBc) | (dBc) |
| 2-carrier W-CDMA | 2110 to 2170 | 28 | 17 | 18.5 | 31 | -37 <mark>[1]</mark> | -41 <mark>11</mark> |

^[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7 dB at 0.01 % probability on CCDF per carrier; carrier spacing 10 MHz.

CAUTION



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

1.2 Features

- Typical 2-carrier W-CDMA performance at frequencies of 2110 MHz and 2170 MHz, a supply voltage of 28 V and an I_{Dq} of 690 mA:
 - ◆ Average output power = 17 W
 - ◆ Gain = 18.5 dB
 - ◆ Efficiency = 31 %
 - ◆ IMD3 = -37 dBc
 - ◆ ACPR = -41 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)



1.3 Applications

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

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Symbol |
|---------|------------------|--------------------|-------------|
| BLC6G22 | 2-75 (SOT895A) | | |
| 1 | drain | | |
| 2 | gate | | 1 |
| 3 | source | [1] | 2 |
| | | | 3 sym112 |
| BLC6G22 | 2LS-75 (SOT896B) | | |
| 1 | drain | | |
| 2 | gate | 1 3 | 1 لـــا |
| 3 | source | [1] | 2 |
| | | | - ' 3 |
| | | | sym112 |

^[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | ackage | | | |
|--------------|---------|---|---------|--|--|
| | Name | Description | Version | | |
| BLC6G22-75 | - | plastic flanged cavity package; 2 mounting slots; 2 leads | SOT895A | | |
| BLC6G22LS-75 | - | plastic earless flanged cavity package; 2 leads | SOT896B | | |

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 | | - | 18 | Α |
| T _{stg} | storage temperature | | -65 | +150 | °C |
| Tj | junction temperature | | - | 225 | °C |

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Туре | Тур | Unit |
|-------------------------|-------------------------|-----------------------------|--------------|------|------|
| $R_{\text{th(j-case)}}$ | thermal resistance from | $T_{case} = 80 ^{\circ}C;$ | BLC6G22-75 | 0.9 | K/W |
| | junction to case | $P_L = 17 W$ | BLC6G22LS-75 | 0.75 | K/W |

6. Characteristics

Table 6. Characteristics

 $T_i = 25 \,^{\circ}C$ unless otherwise specified.

| , | • | | | | | |
|---------------------|----------------------------------|--|------|------|------|------|
| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS} = 0 \text{ V}; I_D = 0.5 \text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10 \text{ V}; I_{D} = 100 \text{ mA}$ | 1.40 | 2 | 2.40 | V |
| V_{GSq} | gate-source quiescent voltage | $V_{DS} = 28 \text{ V}; I_{D} = 690 \text{ mA}$ | 1.60 | 2.2 | 2.60 | V |
| I _{DSS} | drain leakage current | $V_{GS} = 0 \text{ V}; V_{DS} = 28 \text{ V}$ | - | - | 3 | μΑ |
| I _{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75 \text{ V};$ $V_{DS} = 10 \text{ V}$ | 14.9 | 18.5 | - | Α |
| I _{GSS} | gate leakage current | $V_{GS} = 11 \text{ V}; V_{DS} = 0 \text{ V}$ | - | - | 280 | nA |
| 9 _{fs} | forward transconductance | $V_{DS} = 10 \text{ V}; I_D = 5 \text{ A}$ | - | 7.2 | - | S |
| R _{DS(on)} | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75 \text{ V};$ $I_D = 3.5 \text{ A}$ | - | 0.15 | - | Ω |
| C _{rs} | feedback capacitance | $V_{GS} = 0 \text{ V}; V_{DS} = 28 \text{ V};$ f = 1 MHz | - | 1.4 | - | pF |
| | | | | | | |

7. Application information

Table 7. Application information

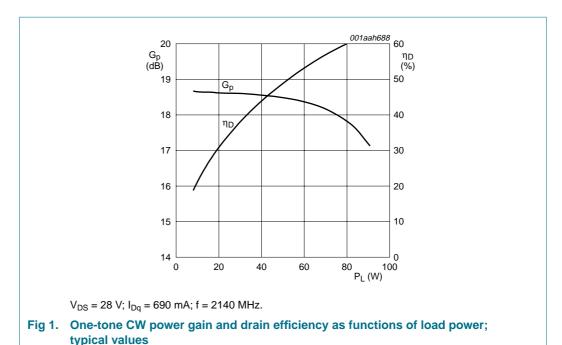
Mode of operation: 2-carrier W-CDMA; PAR 7 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; f_1 = 2112.5 MHz; f_2 = 2122.5 MHz; f_3 = 2157.5 MHz; f_4 = 2167.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 690 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|-------------|--|----------------------------|------|------|-------|------|
| $P_{L(AV)}$ | average output power | | - | 17 | - | W |
| Gp | power gain | $P_{L(AV)} = 17 \text{ W}$ | 17.3 | 18.5 | - | dB |
| IRL | input return loss | $P_{L(AV)} = 17 \text{ W}$ | - | -9.2 | -6.5 | dB |
| η_{D} | drain efficiency | $P_{L(AV)} = 17 \text{ W}$ | 28 | 31 | - | % |
| IMD3 | third order intermodulation distortion | $P_{L(AV)} = 17 \text{ W}$ | - | -37 | -34 | dBc |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 17 \text{ W}$ | - | -41 | -38.5 | dBc |

7.1 Ruggedness in class-AB operation

The BLC6G22-75 and BLC6G22LS-75 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28 \text{ V}$; $I_{Dq} = 690 \text{ mA}$; $P_L = 75 \text{ W}$ (CW); f = 2170 MHz.

7.2 One-tone CW



7.3 Two-tone CW

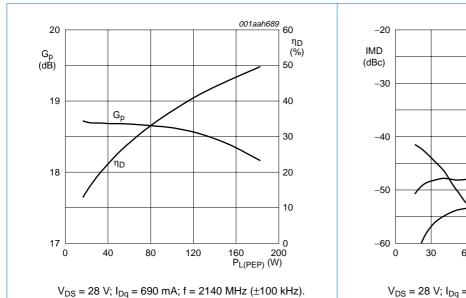


Fig 2. Two-tone CW power gain and drain efficiency as functions of peak envelope load power; typical values

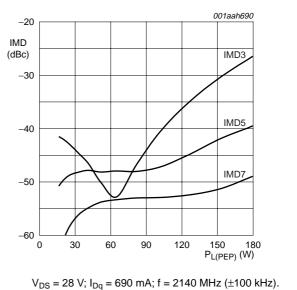
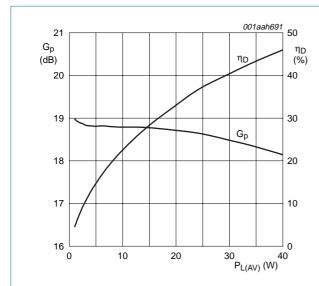


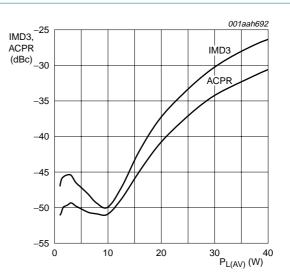
Fig 3. Two-tone CW intermodulation distortion as function of peak envelope load power; typical values

7.4 2-carrier W-CDMA



 V_{DS} = 28 V; I_{Dq} = 950 mA; f = 2140 MHz (\pm 5 MHz); carrier spacing 10 MHz.

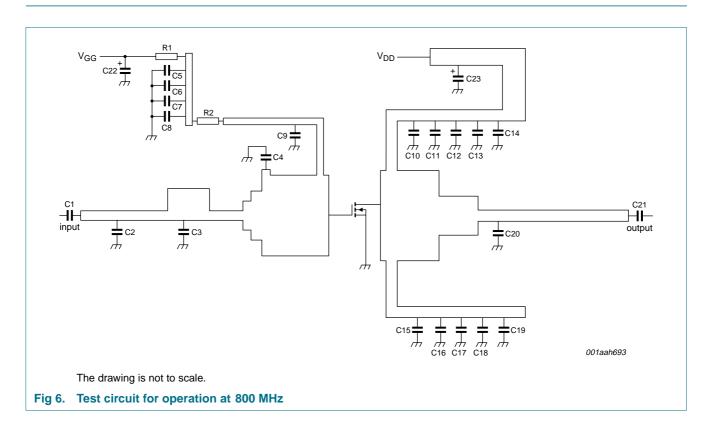
Fig 4. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values



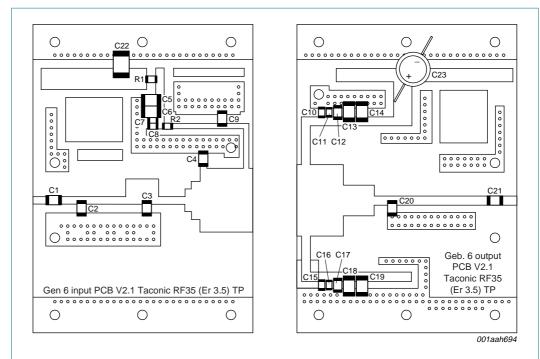
 V_{DS} = 28 V; I_{Dq} = 690 mA; f = 2140 MHz (\pm 5 MHz); carrier spacing 10 MHz.

Fig 5. 2-carrier W-CDMA adjacent channel power ratio and third order intermodulation distortion as functions of average load power; typical values

8. Test information



BLC6G22-75_BLC6G22LS-75_1 © NXP B.V. 2008. All rights reserved.



The striplines are on a double copper-clad Taconic RF35 Printed-Circuit Board (PCB) with $\epsilon_{\text{r}}=3.5$ and thickness = 0.76 mm.

See Table 8 for list of components.

The drawing is not to scale.

Fig 7. Component layout

Table 8. List of components (see Figure 6 and Figure 7)

| Component | Description | Value | | Remarks |
|-------------------------------|-----------------------------------|--------------|-----|--|
| C1 | multilayer ceramic chip capacitor | 5.6 pF | [1] | |
| C2, C3 | multilayer ceramic chip capacitor | 0.5 pF | [1] | |
| C4 | multilayer ceramic chip capacitor | 0.6 pF | [1] | |
| C5, C6, C13, C14, C18, C19 | multilayer ceramic chip capacitor | 1.5 μF | | Murata 0603 or capacitor of same quality |
| C7, C8, C11, C16 | multilayer ceramic chip capacitor | 100 nF | | |
| C9 | multilayer ceramic chip capacitor | 15 pF | [1] | |
| C10, C15 | multilayer ceramic chip capacitor | 220 nF | | |
| C12, C17 | multilayer ceramic chip capacitor | 10 pF | [1] | |
| C20 | multilayer ceramic chip capacitor | 0.3 pF | [1] | |
| C21 | multilayer ceramic chip capacitor | 20 pF | [1] | |
| C22 | tantalum capacitor | 10 μF; 35 V | | |
| C23 | electrolytic capacitor | 220 μF; 35 V | | |
| R1 | SMD resistor | 3.6 Ω | | |
| R2 | SMD resistor | 5.1 Ω | | |

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

9. Package outline

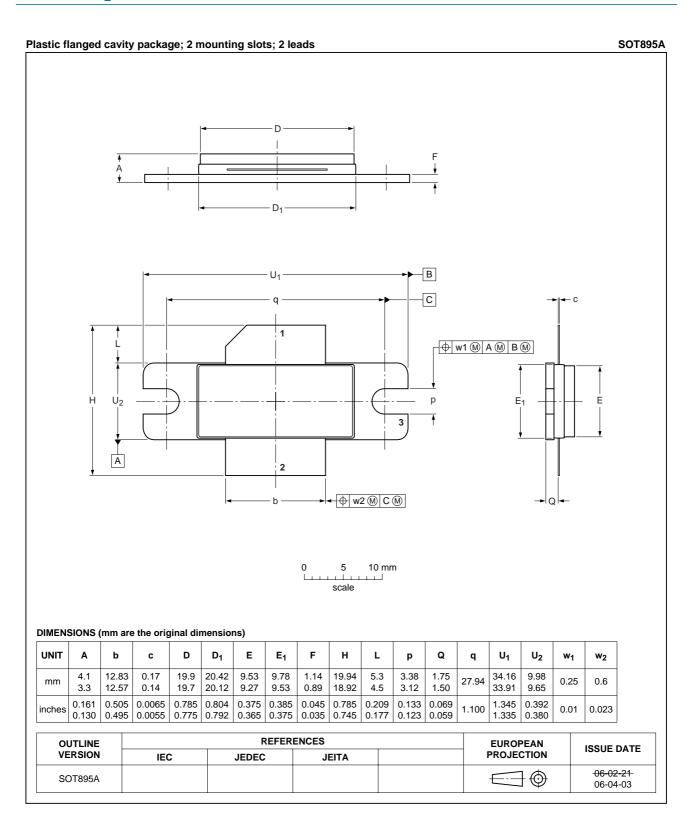


Fig 8. Package outline SOT895A

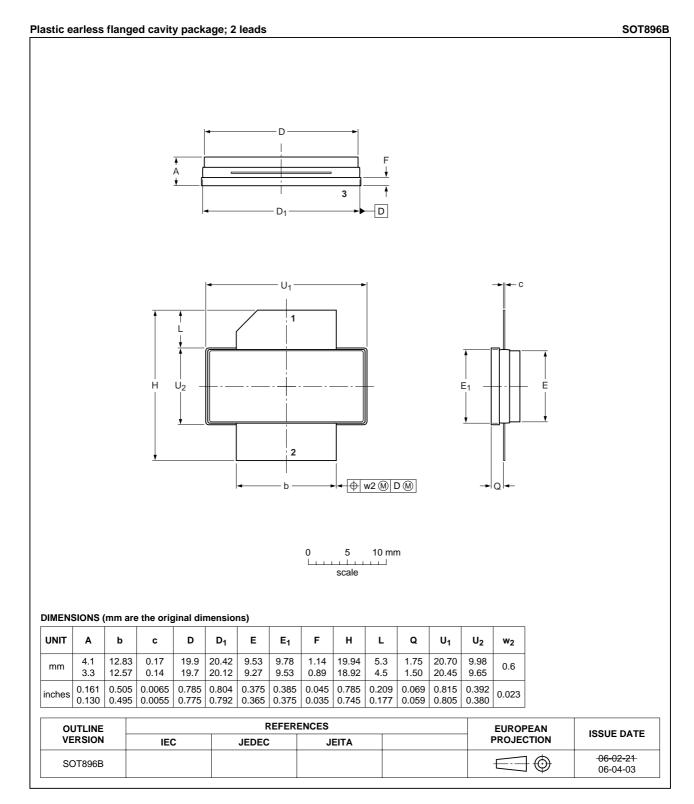


Fig 9. Package outline SOT896B

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 |
| PAR | Peak-to-Average power Ratio |
| PDPCH | transmission Power of the Dedicated Physical CHannel |
| RF | Radio 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 |
|---------------------------|--------------|----------------------|---------------|------------|
| BLC6G22-75_BLC6G22LS-75_1 | 20080207 | Objective 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.nxp.com.

12.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

12.3 Disclaimers

General — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or

malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors accepts no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

12.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

13. Contact information

For additional information, please visit: http://www.nxp.com

For sales office addresses, send an email to: salesaddresses@nxp.com

14. Contents

| 1 | Product profile |
|------|------------------------------------|
| 1.1 | General description |
| 1.2 | Features |
| 1.3 | Applications 2 |
| 2 | Pinning information 2 |
| 3 | Ordering information |
| 4 | Limiting values 2 |
| 5 | Thermal characteristics 3 |
| 6 | Characteristics 3 |
| 7 | Application information 3 |
| 7.1 | Ruggedness in class-AB operation 3 |
| 7.2 | One-tone CW |
| 7.3 | Two-tone CW |
| 7.4 | 2-carrier W-CDMA 5 |
| 8 | Test information |
| 9 | Package outline |
| 10 | Abbreviations 9 |
| 11 | Revision history 9 |
| 12 | Legal information |
| 12.1 | Data sheet status |
| 12.2 | Definitions |
| 12.3 | Disclaimers |
| 12.4 | Trademarks 10 |
| 13 | Contact information |
| 11 | Contonts 11 |

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.



© NXP B.V. 2008.

All rights reserved.