

BLF8G27LS-140

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

140 W LDMOS power transistor for base station applications at frequencies from 2500 MHz to 2700 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 (MHz) | I_{Dq} (mA) | V_{DS} (V) | $P_{L(AV)}$ (W) | G_p (dB) | η_D (%) | ACPR (dBc) |
|------------------|--------------|------------------|-----------------|--------------------|---------------|-----------------|-------------------------|
| 2-carrier W-CDMA | 2600 to 2700 | 1300 | 32 | 45 | 17.4 | 32 | -30 [1] |
| 2-carrier W-CDMA | 2600 to 2700 | 1300 | 28 | 35 | 17.0 | 29 | -31 [1] |

[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

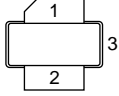
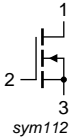
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection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

1.3 Applications

- RF power amplifier for W-CDMA base stations and multi carrier applications in the 2500 MHz to 2700 MHz frequency range

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|---|---|
| 1 | drain |  |  sym112 |
| 2 | gate | | |
| 3 | source | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------|---------|--|---------|
| | Name | Description | Version |
| BLF8G27LS-140 | - | earless flanged 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 |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| T_j | junction temperature | | [1] | 225 | °C |

[1] Continuous use at maximum temperature will affect the reliability.

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Typ | Unit |
|---------------|--|--|------|------|
| $R_{th(j-c)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}; P_L = 55\text{ W}$ | 0.27 | K/W |

6. Characteristics

Table 6. DC 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 | $V_{GS} = 0\text{ V}$; $I_D = 2.16\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}$; $I_D = 216\text{ mA}$ | 1.5 | 1.9 | 2.3 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}$; $V_{DS} = 28\text{ V}$ | - | - | 4.5 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$ | - | 40 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}$; $V_{DS} = 0\text{ V}$ | - | - | 450 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}$; $I_D = 10.8\text{ A}$ | - | 16 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 7.56\text{ A}$ | - | 0.06 | - | Ω |

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; $f_1 = 2622.5\text{ MHz}$; $f_2 = 2627.5\text{ MHz}$; $f_3 = 2682.5\text{ MHz}$; $f_4 = 2687.5\text{ MHz}$; RF performance at $V_{DS} = 32\text{ V}$; $I_{Dq} = 1300\text{ mA}$; $T_{case} = 25\text{ }^\circ\text{C}$; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|--------------------------------------|---------------------------|------|------|-----|------|
| G_p | power gain | $P_{L(AV)} = 45\text{ W}$ | 15.8 | 17.4 | - | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 45\text{ W}$ | - | -18 | -8 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 45\text{ W}$ | 27 | 32 | - | % |
| $ACPR_{5M}$ | adjacent channel power ratio (5 MHz) | $P_{L(AV)} = 45\text{ W}$ | - | -30 | -27 | dBc |

7. Test information

7.1 Ruggedness in class-AB operation

The BLF8G27LS-140 is capable to withstand a load mismatch corresponding to $VSWR = 10 : 1$ through all phases under the following conditions: $V_{DS} = 32\text{ V}$; $I_{Dq} = 1300\text{ mA}$; $P_L = 180\text{ W (CW)}$; $f = 2620\text{ MHz}$.

7.2 Impedance information

Table 8. Typical impedance

$I_{Dq} = 1300\text{ mA}$; $V_{DS} = 32\text{ V}$.

| f (MHz) | Z_S ^[1] (Ω) | Z_L ^[1] (Ω) |
|------------|--------------------------------------|--------------------------------------|
| 2600 | 2.30 – j4.90 | 1.40 – j3.10 |
| 2700 | 3.80 – j4.50 | 1.40 – j3.10 |

[1] Z_S and Z_L defined in [Figure 1](#).

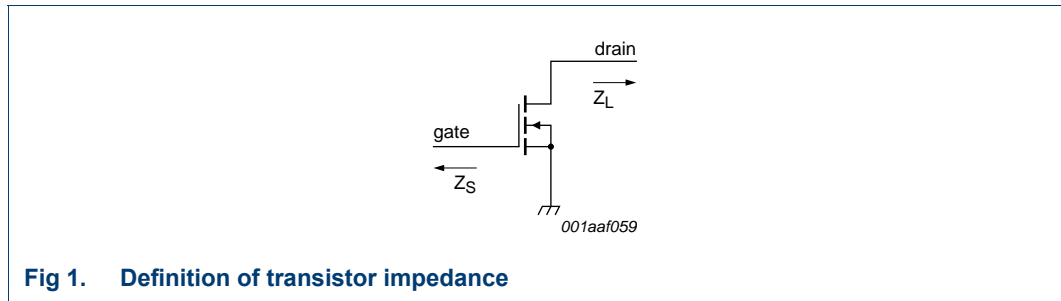
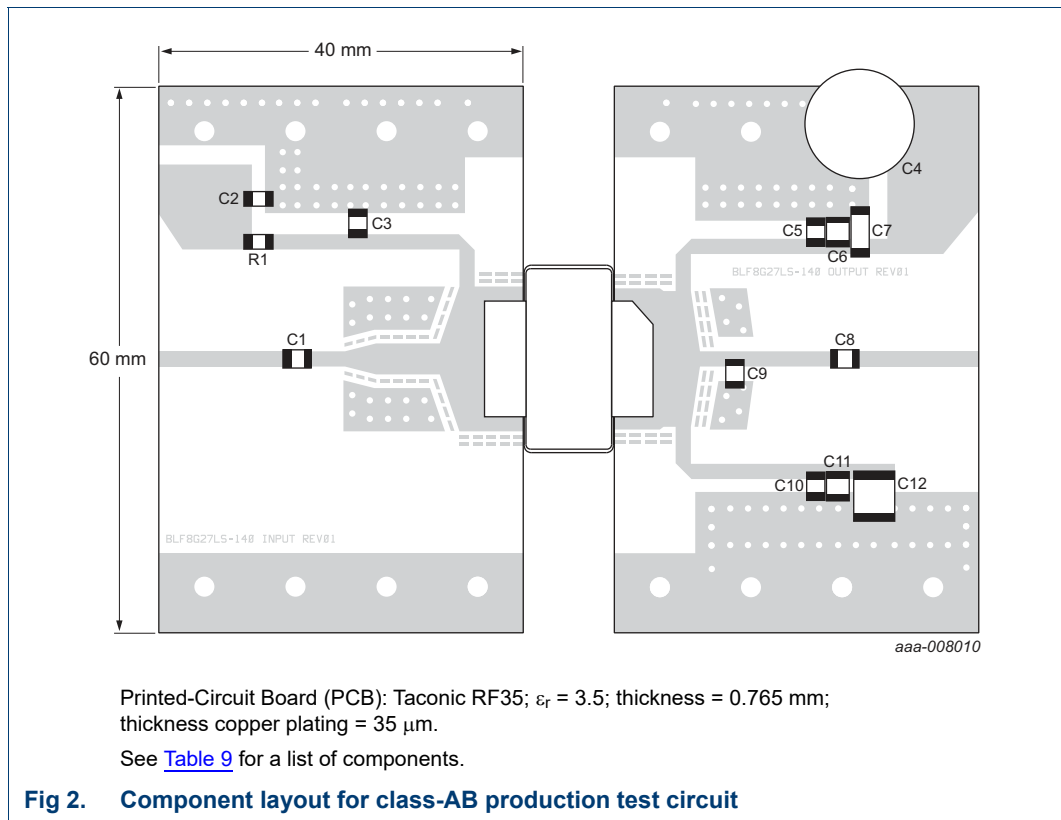


Fig 1. Definition of transistor impedance

7.3 Test circuit



Printed-Circuit Board (PCB): Taconic RF35; $\epsilon_r = 3.5$; thickness = 0.765 mm; thickness copper plating = 35 μm .

See [Table 9](#) for a list of components.

Fig 2. Component layout for class-AB production test circuit

Table 9. List of components

For test circuit see [Figure 2](#).

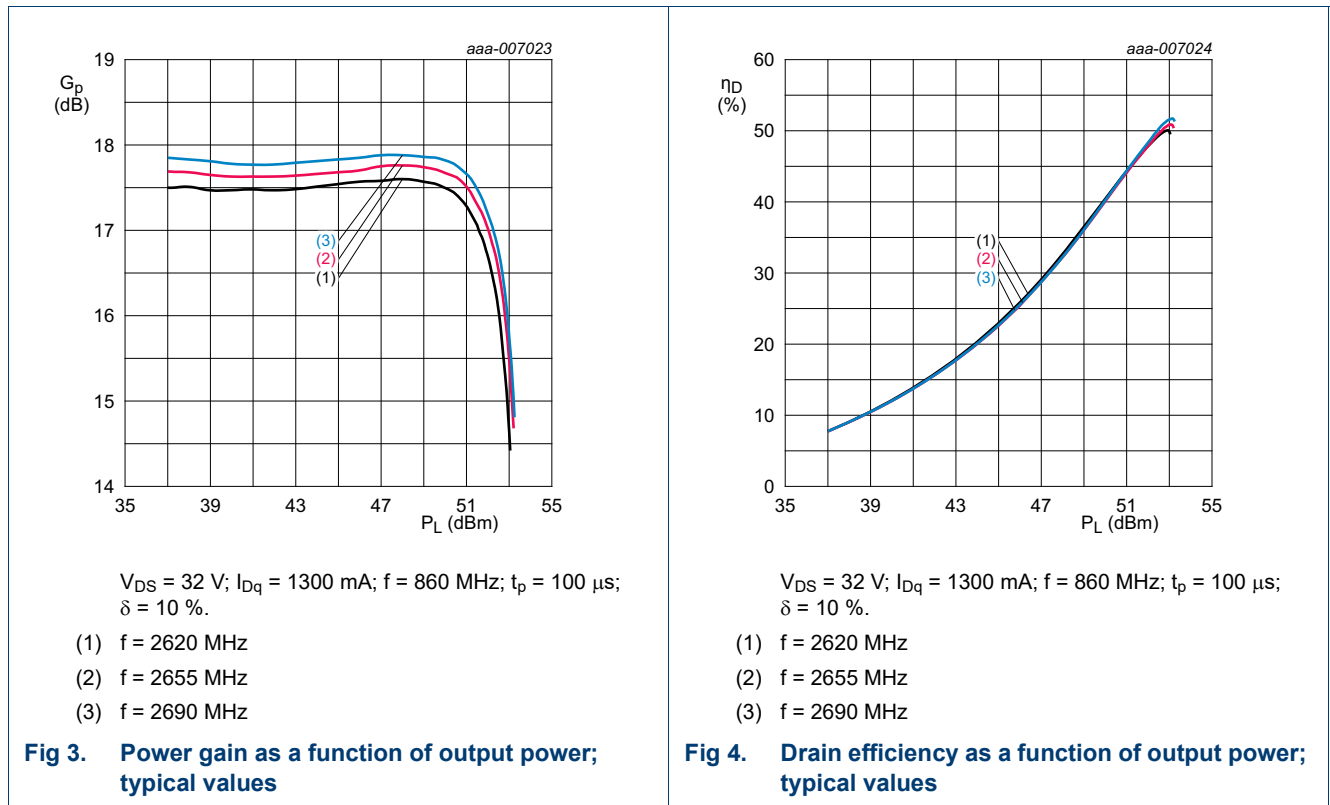
| Component | Description | Value | Remarks |
|---------------------|-----------------------------------|---------------------|------------------|
| C1, C3, C5, C8, C10 | multilayer ceramic chip capacitor | 10 pF | [1] ATC100B |
| C2 | multilayer ceramic chip capacitor | 1 μF, 25 V | [2] Murata |
| C4 | electrolytic capacitor | 470 μF, 63 V | |
| C6, C11 | multilayer ceramic chip capacitor | 1 μF, 50 V | [2] Murata |
| C7, C12 | multilayer ceramic chip capacitor | 10 μF, 50 V | [2] Murata |
| C9 | multilayer ceramic chip capacitor | 0.5 pF | [1] ATC100B |
| R1 | chip resistor | 3.9 Ω, 1% tolerance | Philips SMD 1206 |

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

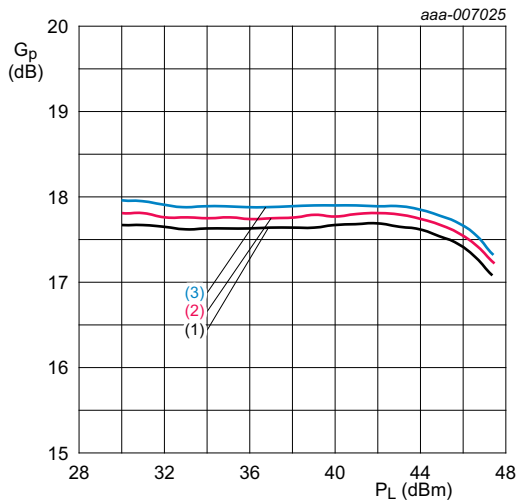
[2] Murata or capacitor of same quality.

7.4 Graphical data

7.4.1 Pulsed CW

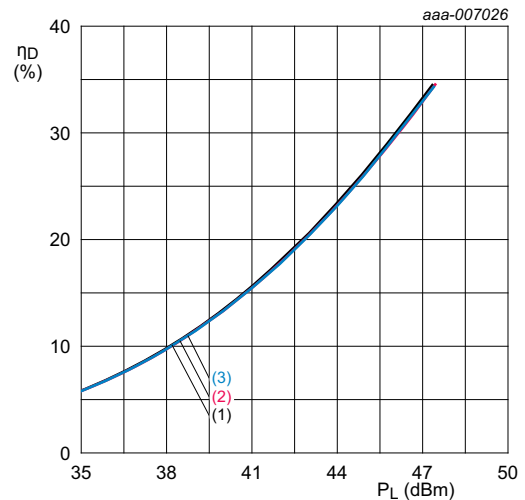


7.4.2 IS-95



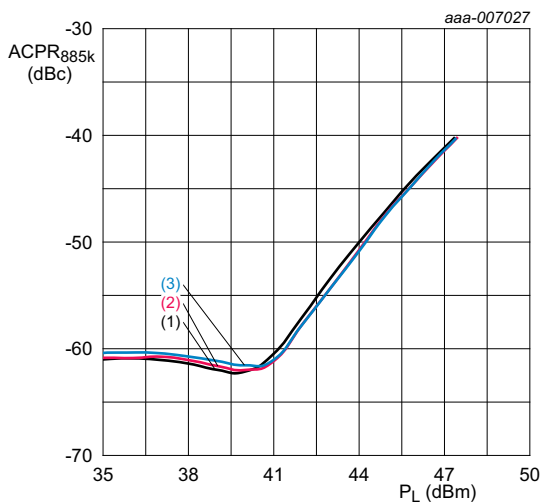
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2620\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2690\text{ MHz}$

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



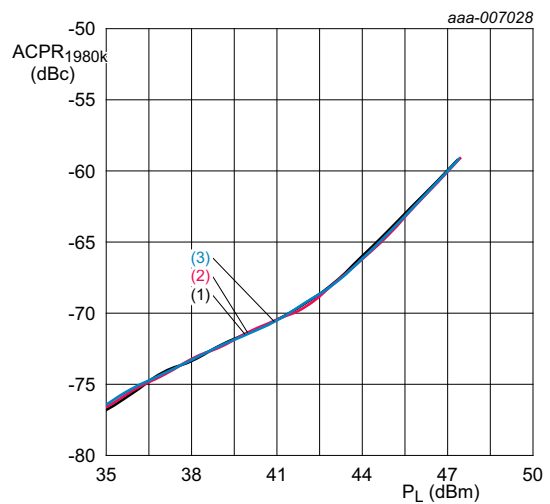
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2620\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2690\text{ MHz}$

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



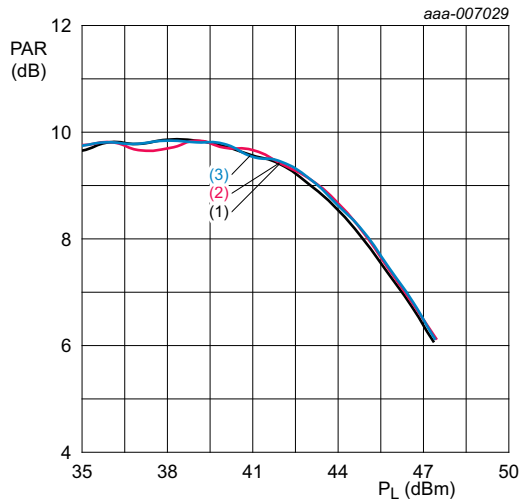
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2620\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2690\text{ MHz}$

Fig 7. Adjacent channel power ratio (885 kHz) as a function of output power; typical values



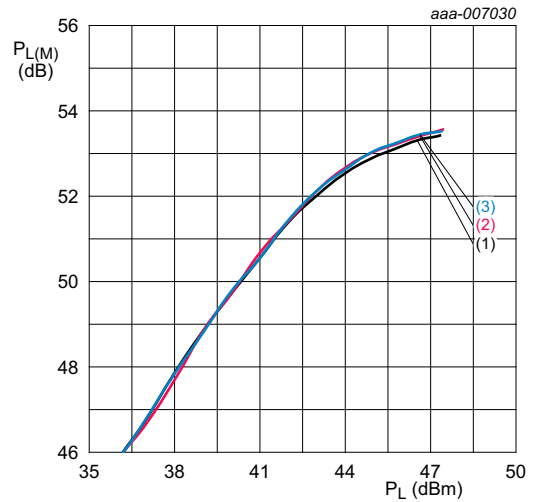
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2620\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2690\text{ MHz}$

Fig 8. Adjacent channel power ratio (1980 kHz) as a function of output power; typical values



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2620\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2690\text{ MHz}$

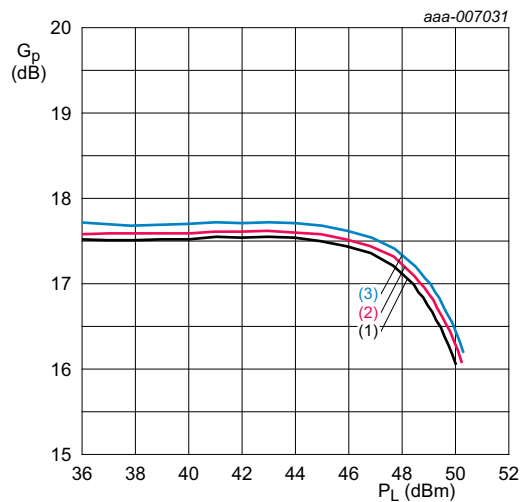
Fig 9. Peak-to-average power ratio as a function of output power; typical values



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2620\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2690\text{ MHz}$

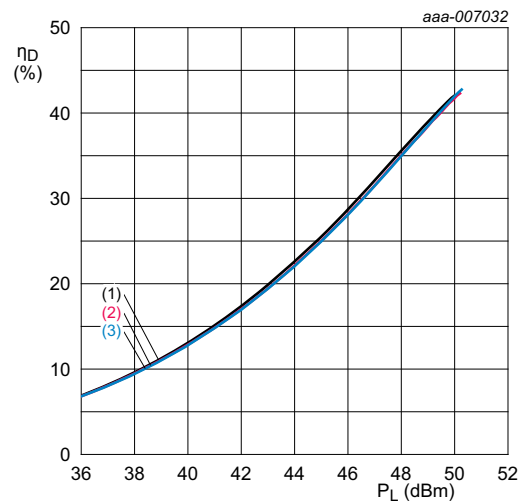
Fig 10. Peak output power as a function of output power; typical values

7.4.3 1-Carrier W-CDMA



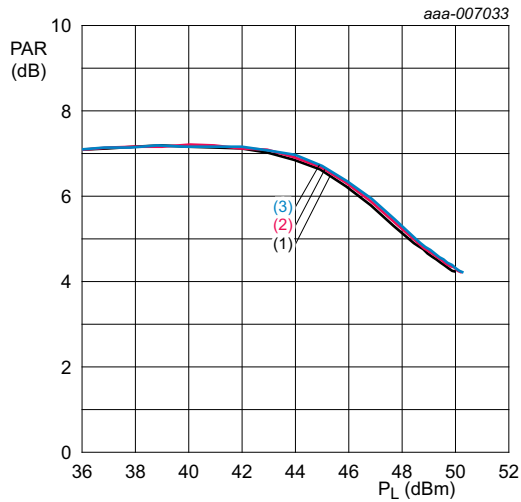
$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2622.5\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2687.5\text{ MHz}$

Fig 11. Power gain as a function of output power; typical values



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}.$
 (1) $f = 2622.5\text{ MHz}$
 (2) $f = 2655\text{ MHz}$
 (3) $f = 2687.5\text{ MHz}$

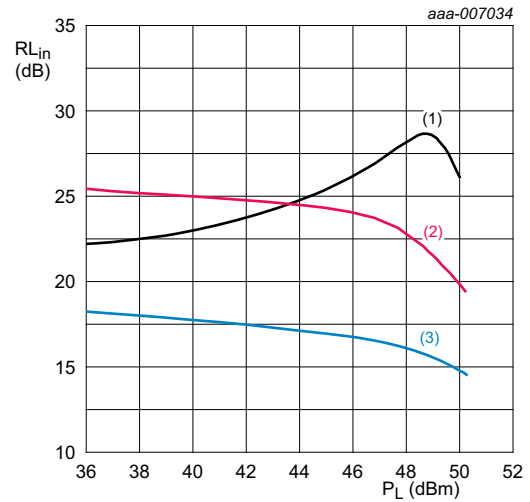
Fig 12. Drain efficiency as a function of output power; typical values



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$.

- (1) $f = 2622.5\text{ MHz}$
- (2) $f = 2655\text{ MHz}$
- (3) $f = 2687.5\text{ MHz}$

Fig 13. Peak-to-average power ratio as a function of output power; typical values

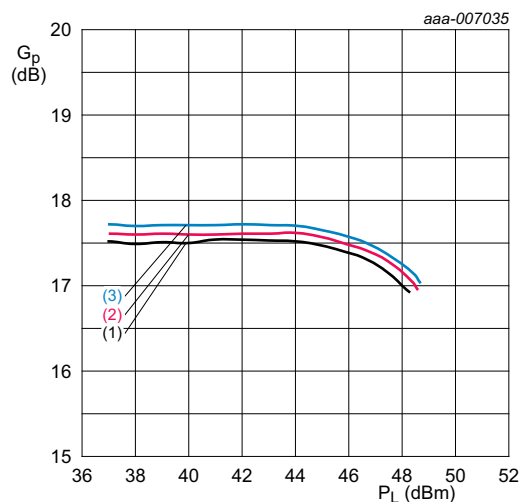


$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$.

- (1) $f = 2622.5\text{ MHz}$
- (2) $f = 2655\text{ MHz}$
- (3) $f = 2687.5\text{ MHz}$

Fig 14. Input return loss as a function of output power; typical values

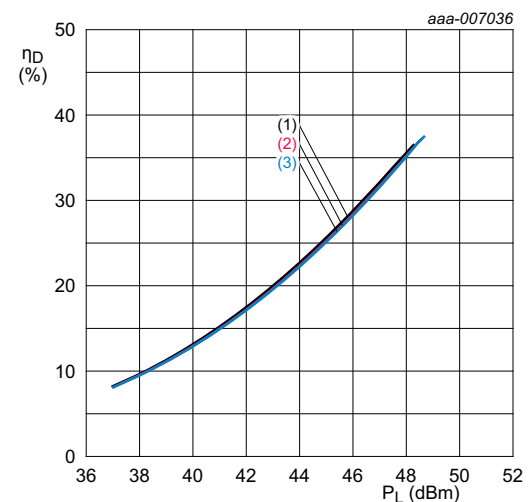
7.4.4 2-Carrier W-CDMA



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$.

- (1) $f = 2625\text{ MHz}$
- (2) $f = 2655\text{ MHz}$
- (3) $f = 2685\text{ MHz}$

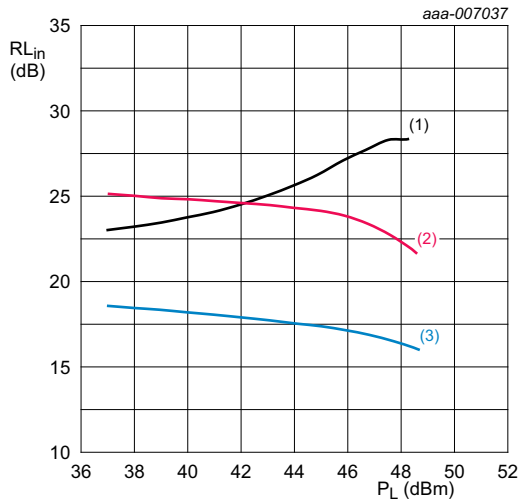
Fig 15. Power gain as a function of output power; typical values



$V_{DS} = 32\text{ V}; I_{Dq} = 1300\text{ mA}$.

- (1) $f = 2625\text{ MHz}$
- (2) $f = 2655\text{ MHz}$
- (3) $f = 2685\text{ MHz}$

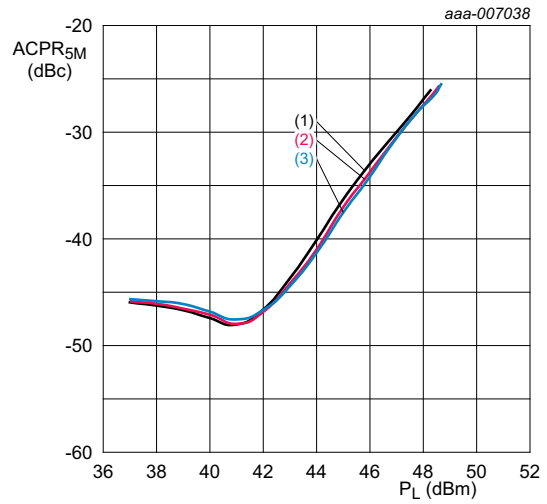
Fig 16. Drain efficiency as a function of output power; typical values



V_{DS} = 32 V; I_{Dq} = 1300 mA.

- (1) f = 2625 MHz
- (2) f = 2655 MHz
- (3) f = 2685 MHz

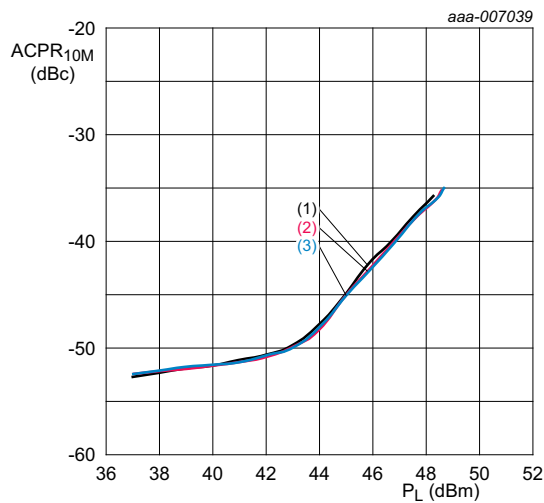
Fig 17. Input return loss as a function of output power; typical values



V_{DS} = 32 V; I_{Dq} = 1300 mA.

- (1) f = 2625 MHz
- (2) f = 2655 MHz
- (3) f = 2685 MHz

Fig 18. Adjacent channel power ratio (5 MHz) as a function of output power; typical values



V_{DS} = 32 V; I_{Dq} = 1300 mA.

- (1) f = 2625 MHz
- (2) f = 2655 MHz
- (3) f = 2685 MHz

Fig 19. Adjacent channel power ratio (10 MHz) as a function of output power; typical values

8. Package outline

Earless flanged ceramic package; 2 leads

SOT502B

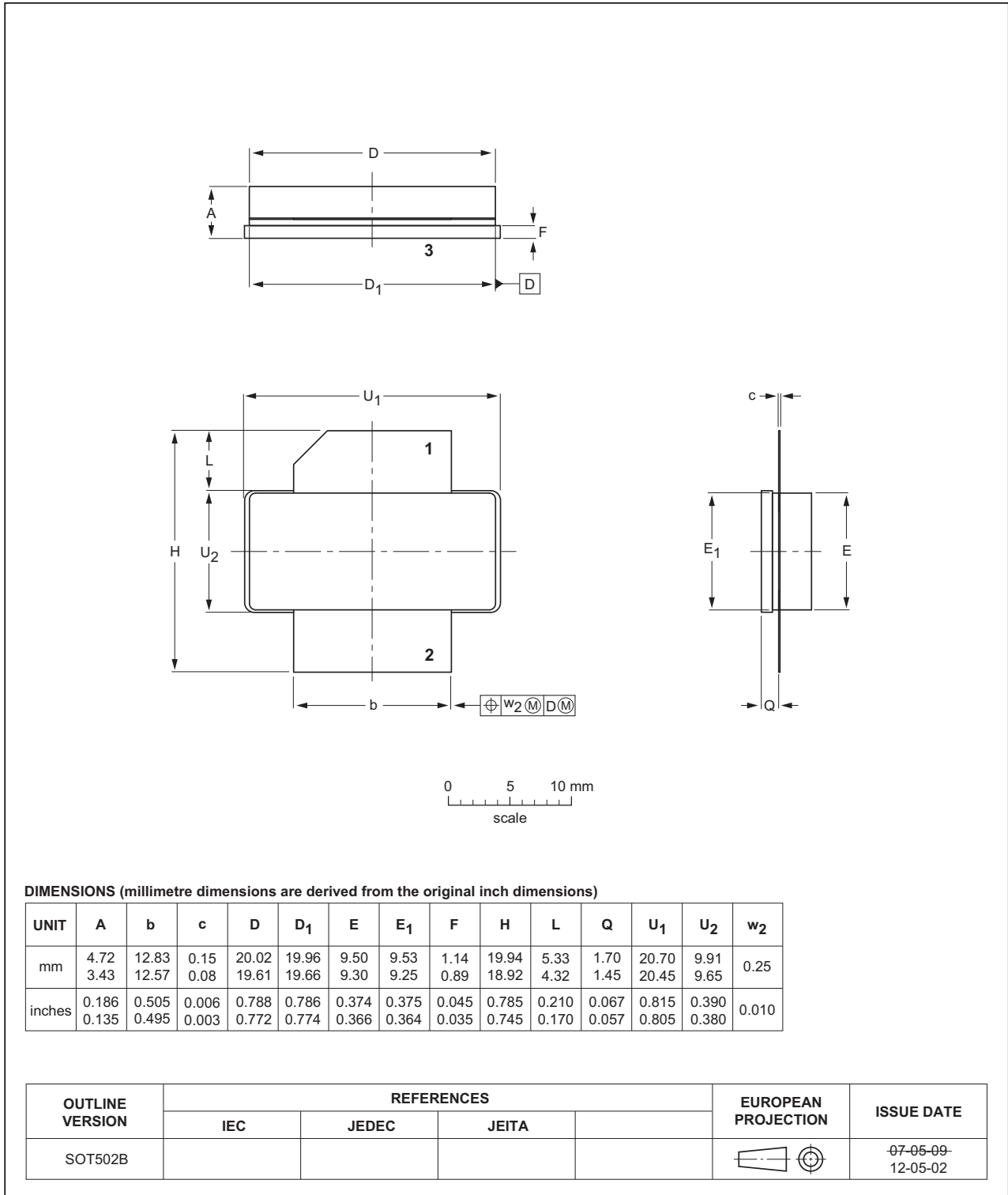


Fig 20. Package outline SOT502B

9. Handling information

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

10. Abbreviations

Table 10. Abbreviations

| Acronym | Description |
|---------|--|
| 3GPP | 3rd Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CW | Continuous Wave |
| DPCH | Dedicated Physical CHannel |
| ESD | ElectroStatic Discharge |
| IS-95 | Interim Standard 95 |
| LDMOS | Laterally Diffused Metal Oxide Semiconductor |
| PAR | Peak-to-Average Ratio |
| SMD | Surface Mounted Device |
| VSWR | Voltage Standing Wave Ratio |
| W-CDMA | Wideband Code Division Multiple Access |

11. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--|----------------------|---------------|-------------------|
| BLF8G27LS-140#3 | 20150901 | Product data sheet | - | BLF8G27LS-140 v.2 |
| Modifications: | <ul style="list-style-type: none"> 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. | | | |
| BLF8G27LS-140 v.2 | 20130605 | Product data sheet | - | BLF8G27LS-140 v.1 |
| BLF8G27LS-140 v.1 | 20130328 | 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. |
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[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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