

BLF6G27-10; BLF6G27-10G

WiMAX power LDMOS transistor

Rev. 5 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

10 W LDMOS power transistor for base station applications at frequencies from 2300 MHz to 2400 MHz and 2500 MHz to 2700 MHz.

Table 1. Typical performance

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

| Mode of operation | f (MHz) | V _{DS} (V) | P _{L(AV)} (W) | G _p (dB) | η _D (%) | ACPR _{885k} (dBc) | ACPR _{1980k} (dBc) |
|---------------------|--------------|------------------------|---------------------------|------------------------|-----------------------|-------------------------------|--------------------------------|
| 1-carrier N-CDMA[1] | 2500 to 2700 | 28 | 2 | 19 | 20 | -49[2] | -64[2] |
| IS-95 | 2300 to 2400 | 28 | 2 | 22.5 | 24.8 | -47[2] | -64[2] |

[1] Single carrier N-CDMA with pilot, paging sync and 6 traffic channels (Walsh codes 8 - 13).
PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz.

[2] Measured within 30 kHz bandwidth.

1.2 Features and benefits

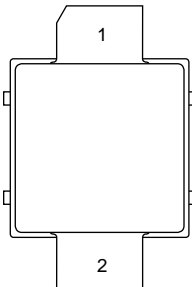
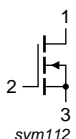
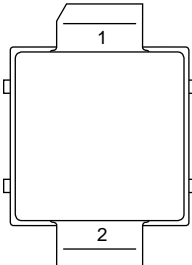
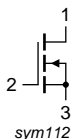
- Typical 1-carrier N-CDMA performance (Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels [Walsh codes 8 - 13]. PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz), a supply voltage of 28 V and an I_{DQ} of 130 mA:
- Qualified up to a maximum V_{DS} operation of 32 V
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation
- Internally matched for ease of use
- Low gold plating thickness on leads
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for base stations and multi carrier applications in the 2300 MHz to 2400 MHz and 2500 MHz to 2700 MHz frequency range.

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----------------------|----------------------------|--|---|
| BLF6G27-10 (SOT975B) | | | |
| 1 | drain |  |  |
| 2 | gate | | |
| 3 | source [1] | | |
| BLF6G27-10G (SOT975C) | | | |
| 1 | drain |  |  |
| 2 | gate | | |
| 3 | source [1] | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|---------|--|---------|
| | Name | Description | Version |
| BLF6G27-10 | - | earless flanged ceramic package; 2 leads | SOT975B |
| BLF6G27-10G | - | earless flanged ceramic package; 2 leads | SOT975C |

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 | | - | 3.5 | A |
| T_{stg} | storage temperature | | -65 | +150 | °C |
| T_j | junction temperature | | - | 225 | °C |

5. Thermal characteristics

Table 5. Thermal characteristics

| Symbol | Parameter | Conditions | Type | Typ | Unit |
|------------------|--|--|-------------|-----|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C};$ $P_L = 10\text{ W (CW)}$ | BLF6G27-10 | 4.0 | K/W |
| | | | BLF6G27-10G | 4.0 | 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 | $V_{GS} = 0\text{ V}; I_D = 0.18\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 18\text{ mA}$ | 1.4 | 1.9 | 2.4 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$ | - | - | 1.4 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$ | 2.7 | - | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 140 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 0.9\text{ A}$ | 0.8 | - | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 0.6\text{ A}$ | 328 | - | 1256 | $\text{m}\Omega$ |
| C_{rs} | feedback capacitance | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V};$ $f = 1\text{ MHz}$ | - | 3.6 | - | pF |

7. Application information

Table 7. Application information

Mode of operation: Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR 9.7 dB at 0.01 % probability on CCDF; Channel Bandwidth is 1.23 MHz; $f_1 = 2500\text{ MHz}; f_2 = 2600\text{ MHz}; f_3 = 2700\text{ MHz};$ RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 130\text{ mA};$ $T_{case} = 25\text{ °C};$ unless otherwise specified; in a class-AB production circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|---|------------------------------|------|-----|-----|------|
| $P_{L(AV)}$ | average output power | | - | 2 | - | W |
| G_p | power gain | $P_{L(AV)} = 2\text{ W}$ | 17.5 | 19 | - | dB |
| RL_{in} | input return loss | $P_{L(AV)} = 2\text{ W}$ | - | -10 | - | dB |
| η_D | drain efficiency | $P_{L(AV)} = 2\text{ W}$ | 18 | 20 | - | % |
| $ACPR_{885k}$ | adjacent channel power ratio (885 kHz) | $P_{L(AV)} = 2\text{ W}$ [1] | - | -49 | -46 | dBc |
| $ACPR_{1980k}$ | adjacent channel power ratio (1980 kHz) | $P_{L(AV)} = 2\text{ W}$ [1] | - | -64 | -61 | dBc |

[1] Measured within 30 kHz bandwidth.

7.1 Ruggedness in class-AB operation

The BLF6G27-10 and BLF6G27-10G are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28\text{ V}; I_{Dq} = 130\text{ mA}; P_L = P_{L(1dB)}; f = 2700\text{ MHz}.$

7.2 Ampleon WiMAX signal

7.2.1 WiMAX signal description

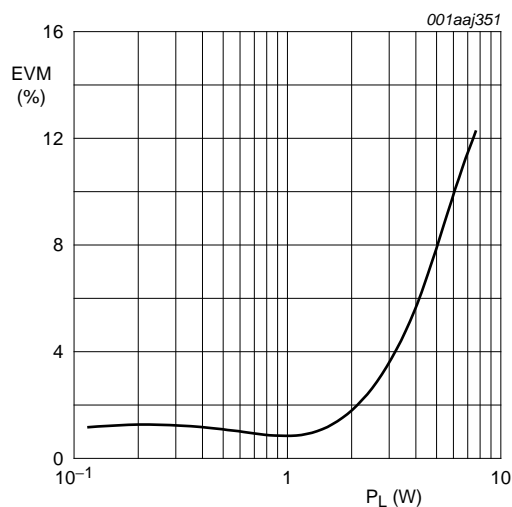
frame duration = 5 ms; bandwidth = 10 MHz; sequency = 1 frame;
frequency band = WCS; sampling rate = 11.2 MHz; $n = 8 / 7$; $G = T_g / T_b = 1 / 8$;
FFT = 1024; zone type = PUSC; $\delta = 97.7$ %; number of symbols = 46;
number of subchannels = 30; PAR = 9.5 dB.

Preamble: 1 symbol \times 30 subchannels; $P_L = P_{L(nom)} + 3.86$ dB.

Table 8. Frame structure

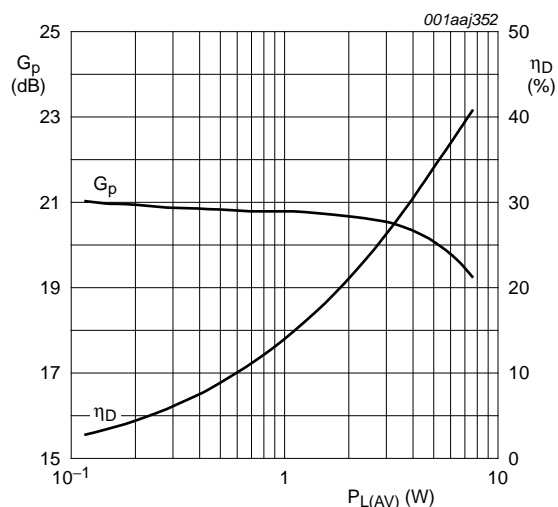
| Frame contents | | | Modulation technique | Data length |
|----------------|------|------------------------------------|----------------------|-------------|
| Zone 0 | FCH | 2 symbols \times 4 subchannels | QPSK1/2 | 3 bit |
| Zone 0 | data | 2 symbols \times 26 subchannels | 64QAM3/4 | 692 bit |
| Zone 0 | data | 44 symbols \times 30 subchannels | 64QAM3/4 | 10000 bit |

7.2.2 Graphs



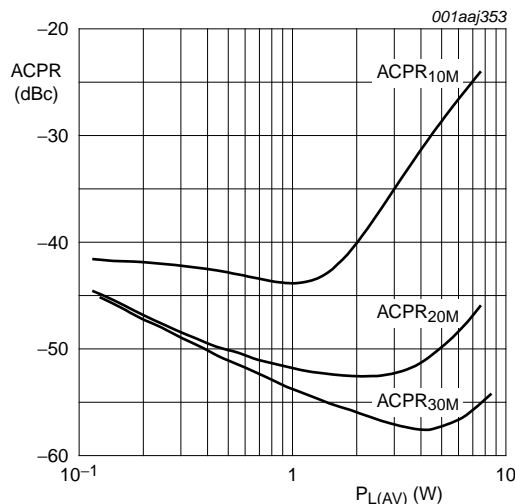
$V_{DS} = 28$ V; $I_{DQ} = 130$ mA; $f = 2600$ MHz.

Fig 1. EVM as a function of load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 130$ mA; $f = 2600$ MHz.

Fig 2. Power gain and drain efficiency as function of average load power; typical values

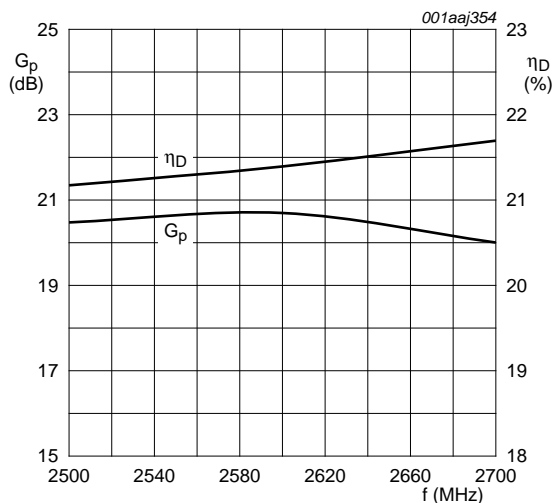


$V_{DS} = 28 \text{ V}$; $I_{DQ} = 130 \text{ mA}$; $f = 2600 \text{ MHz}$.

Fig 3. Adjacent channel power ratio as a function of average load power; typical values

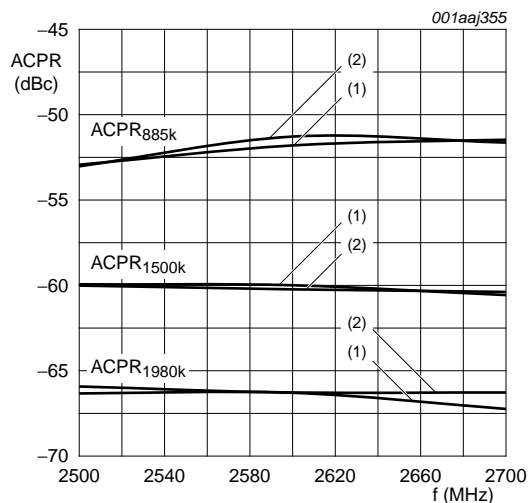
7.3 Single carrier NA IS-95 broadband performance at 2 W average

7.3.1 Graphs



$V_{DS} = 28 \text{ V}$; $I_{DQ} = 130 \text{ mA}$; Single Carrier IS-95;
PAR = 9.7 dB at 0.01 % probability.

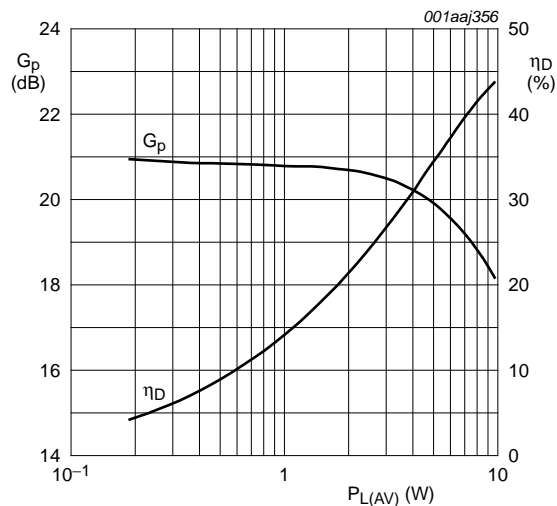
Fig 4. Power gain and drain efficiency as function of frequency; typical values



$V_{DS} = 28 \text{ V}$; $I_{DQ} = 130 \text{ mA}$; single carrier IS-95;
PAR = 9.7 dB at .01 % probability.

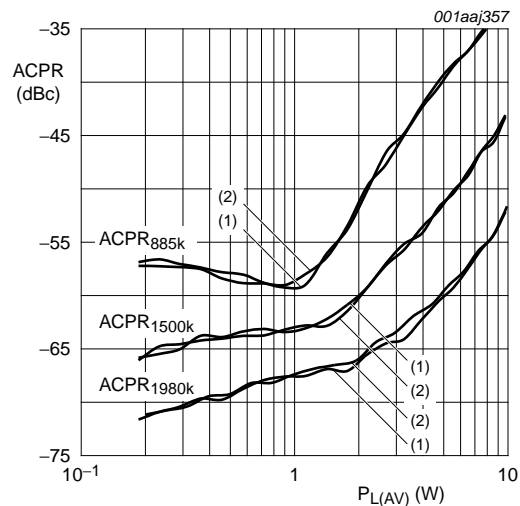
- (1) Low frequency component
- (2) High frequency component

Fig 5. Adjacent channel power ratio as a function of frequency; typical values



$V_{DS} = 28$ V; $I_{DQ} = 130$ mA; $f = 2600$ MHz;
single carrier IS-95; PAR = 9.7 dB at 0.01 % probability;
channel bandwidth = 1.23 MHz.

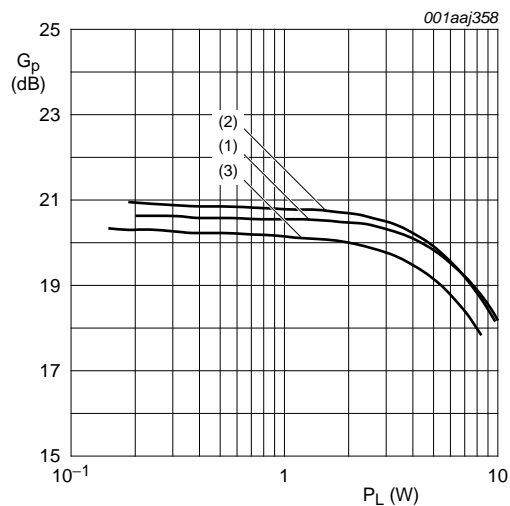
Fig 6. Power gain and drain efficiency as function of load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 130$ mA; $f = 2600$ MHz;
single carrier IS-95; PAR = 9.7 dB at 0.01 % probability;
channel bandwidth = 1.23 MHz; IBW = 30 kHz.

- (1) Low frequency component
- (2) High frequency component

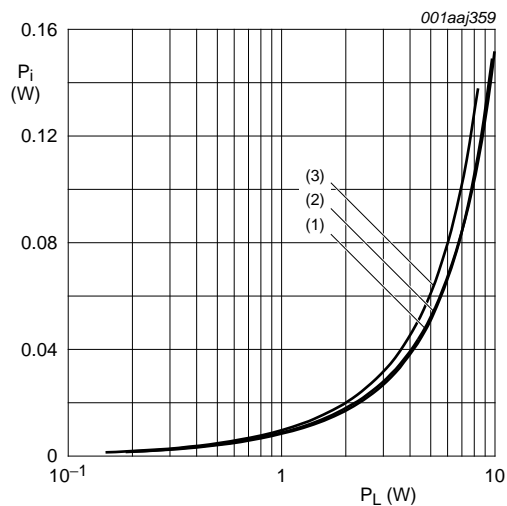
Fig 7. Adjacent channel power ratio as a function of load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 130$ mA; single carrier IS-95;
PAR = 9.7 dB at 0.01 % probability;
channel bandwidth = 1.23 MHz.

- (1) $f = 2500$ MHz
- (2) $f = 2600$ MHz
- (3) $f = 2700$ MHz

Fig 8. Power gain as a function of load power; typical values

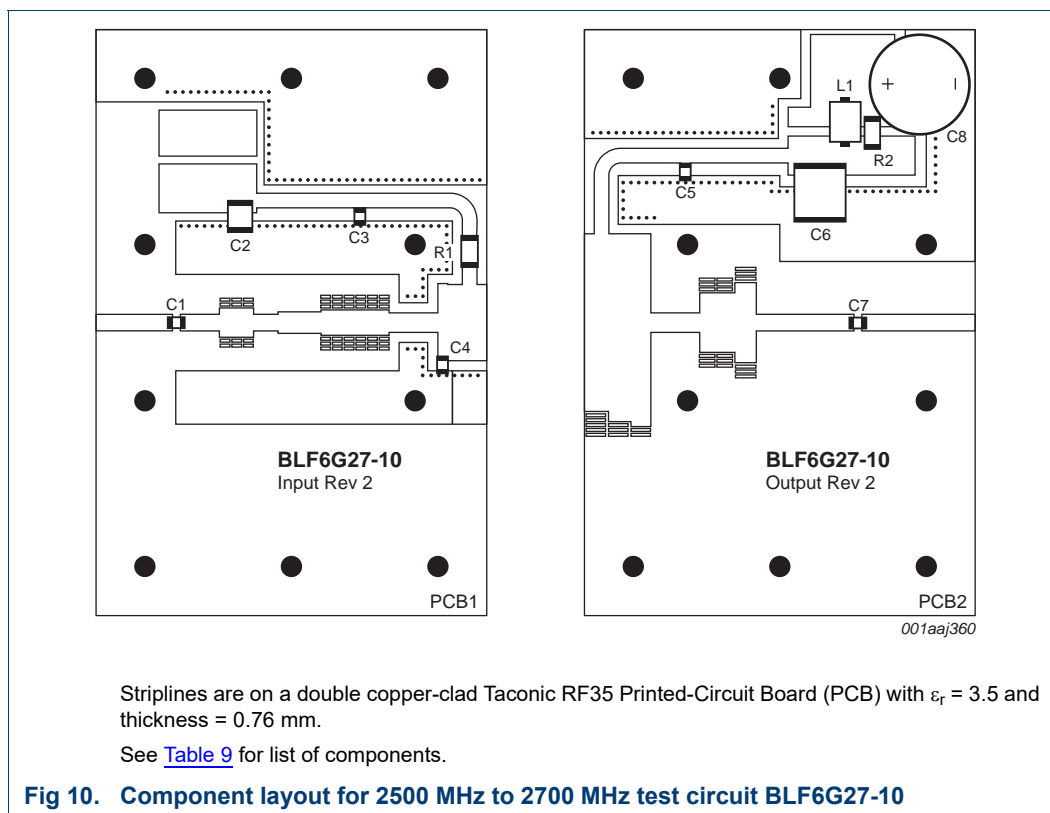


$V_{DS} = 28$ V; $I_{DQ} = 130$ mA; single carrier IS-95;
PAR = 9.7 dB at 0.01 % probability;
channel bandwidth = 1.23 MHz.

- (1) $f = 2500$ MHz
- (2) $f = 2600$ MHz
- (3) $f = 2700$ MHz

Fig 9. Input power as a function of load power; typical values

8. Test information



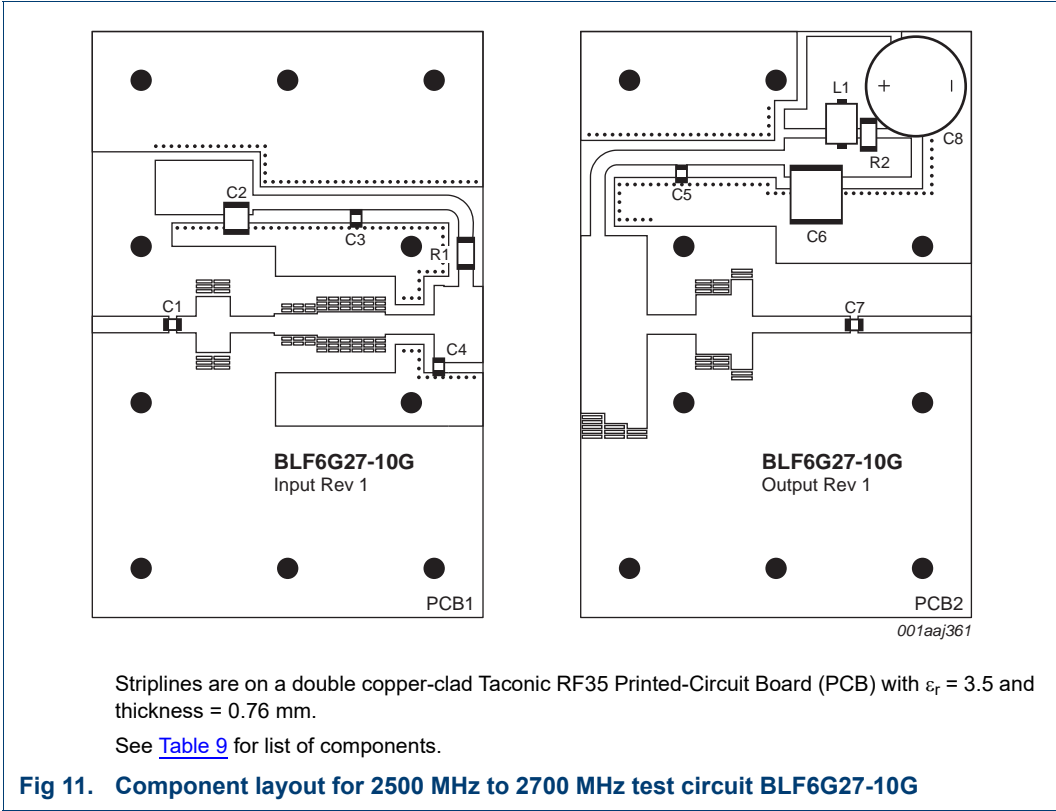


Table 9. List of components
For test circuit, see [Figure 10](#) and [Figure 11](#).

| Component | Description | Value | Remarks |
|----------------|-----------------------------------|-------------------|-----------------|
| C1, C3, C5, C7 | multilayer ceramic chip capacitor | 22 pF | ATC 100A |
| C2 | multilayer ceramic chip capacitor | 1.5 μ F | TDK |
| C4 | multilayer ceramic chip capacitor | 1.6 pF | ATC 100A |
| C6 | multilayer ceramic chip capacitor | 10 μ F; 50 V | TDK |
| C8 | electrolytic capacitor | 220 μ F; 63 V | Elco |
| L1 | ferrite SMD bead | - | Ferroxcube bead |
| R1, R2 | SMD resistor | 8.2 Ω | Thin film |

Table 10. Measured test circuit impedances

| f | Z _i | Z _o |
|--------------------|----------------|----------------|
| (GHz) | (Ω) | (Ω) |
| BLF6G27-10 | | |
| 2.50 | 5.32 – j8.61 | 9.46 – j6.99 |
| 2.55 | 4.85 – j8.09 | 9.44 – j7.41 |
| 2.60 | 4.40 – j7.55 | 9.32 – j7.86 |
| 2.65 | 3.98 – j7.00 | 9.10 – j8.31 |
| 2.70 | 3.59 – j6.43 | 8.77 – j8.75 |
| BLF6G27-10G | | |
| 2.50 | 5.67 – j13.62 | 10.70 – j7.38 |
| 2.55 | 5.06 – j12.79 | 10.61 – j8.00 |
| 2.60 | 4.55 – j11.98 | 10.38 – j8.63 |
| 2.65 | 4.10 – j11.19 | 10.00 – j9.24 |
| 2.70 | 3.71 – j10.43 | 9.49 – j9.79 |

9. Package outline

Earless flanged ceramic package; 2 leads

SOT975B

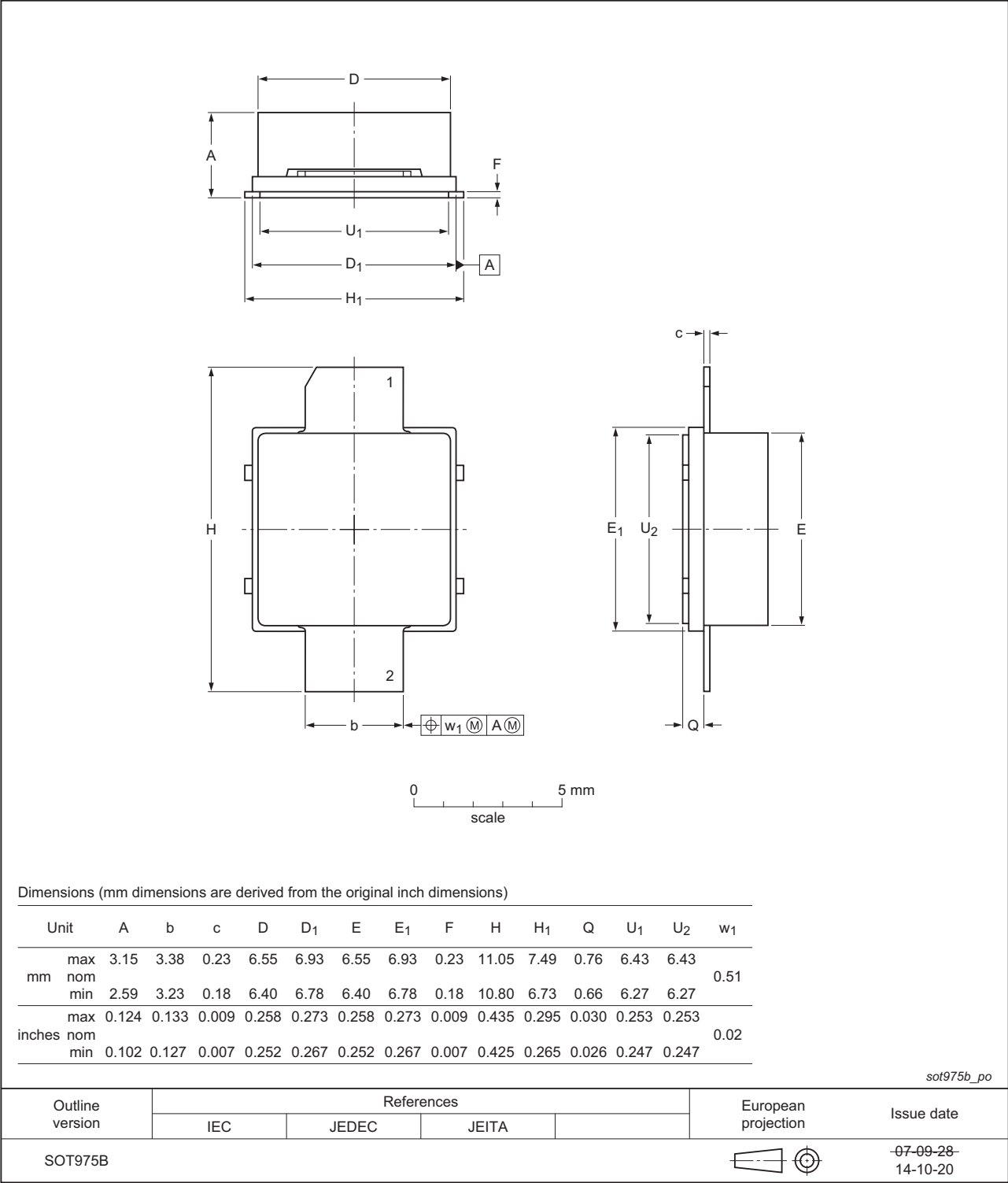


Fig 12. Package outline SOT975B

Earless flanged ceramic package; 2 leads

SOT975C

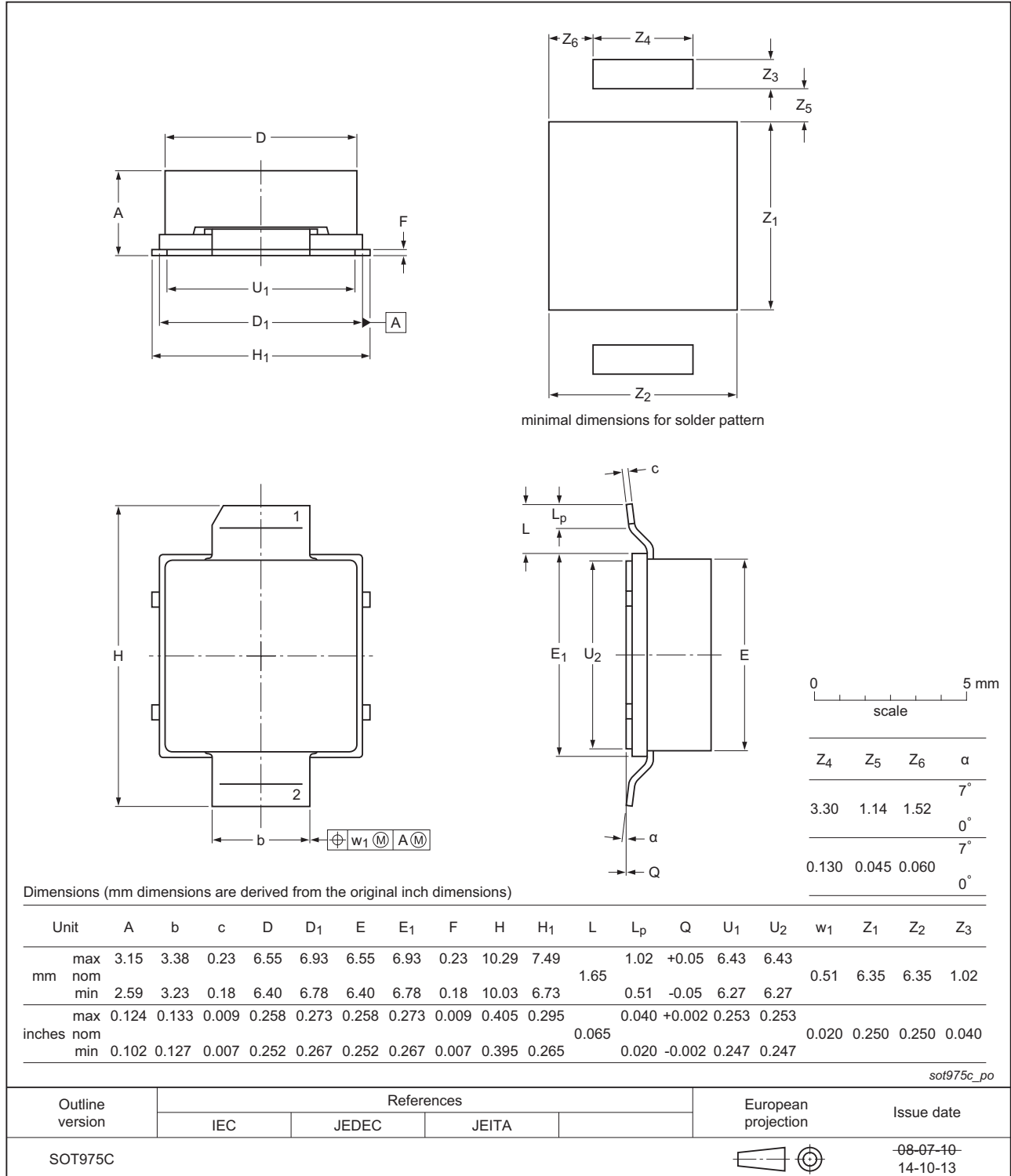


Fig 13. Package outline SOT975C

10. Abbreviations

Table 11. Abbreviations

| Acronym | Description |
|---------|---|
| CCDF | Complementary Cumulative Distribution Function |
| CW | Continuous Wave |
| EVM | Error Vector Magnitude |
| FCH | Frame Control Header |
| FFT | Fast Fourier Transform |
| IBW | Instantaneous BandWidth |
| IS-95 | Interim Standard 95 |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| NA | North American |
| N-CDMA | Narrowband Code Division Multiple Access |
| PAR | Peak-to-Average power Ratio |
| PUSC | Partial Usage of SubChannels |
| RF | Radio Frequency |
| SMD | Surface Mounted Device |
| VSWR | Voltage Standing-Wave Ratio |
| WCS | Wireless Communications Service |
| WiMAX | Worldwide Interoperability for Microwave Access |

11. Revision history

Table 12. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------------------|--|--------------------|---------------|----------------------------|
| BLF6G27-10_BLF6G27-10G#5 | 20150901 | Product data sheet | - | BLF6G27-10_BLF6G27-10G v.4 |
| 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. | | | |
| BLF6G27-10_BLF6G27-10G v.4 | 20141216 | Product data sheet | - | BLF6G27-10_BLF6G27-10G v.3 |
| BLF6G27-10_BLF6G27-10G v.3 | 20110228 | Product data sheet | - | BLF6G27-10_BLF6G27-10G v.2 |
| BLF6G27-10_BLF6G27-10G v.2 | 20101202 | Product data sheet | - | BLF6G27-10_BLF6G27-10G v.1 |
| BLF6G27-10_BLF6G27-10G v.1 | 20090204 | Product data sheet | - | - |

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12.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
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