# BLF8G10LS-270V; BLF8G10LS-270GV

## Power LDMOS transistor

Rev. 1 — 3 December 2012 Product data sheet

## 1. Product profile

### 1.1 General description

270 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 790 MHz to 960 MHz.

**Table 1. Typical performance**

*Typical RF performance at $T_{case}$ = 25 °C in a common source class-AB production test circuit, tested on straight lead device.*

| Test signal | f | $V_{DS}$ | $P_{L(AV)}$ | $G_p$ | $\eta_D$ | $ACPR_{5M}$ |
|---|---|---|---|---|---|---|
| | (MHz) | (V) | (W) | (dB) | (%) | (dBc) |
| 2-carrier W-CDMA | 869 to 894 | 28 | 67 | 19.5 | 31 | –37[1] |

[1] Test signal: 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 10 MHz.

### 1.2 Features and benefits

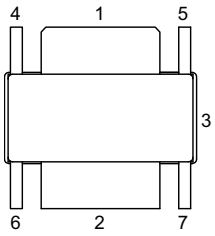
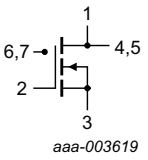
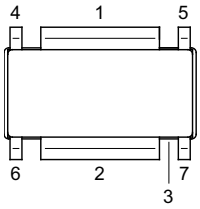
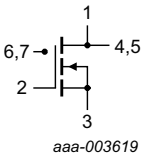
- Excellent ruggedness
- High efficiency
- Low $R_{th}$ providing excellent thermal stability
- Designed for broadband operation (790 MHz to 960 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Decoupling leads to enable improved video bandwidth (55 MHz typical)
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Design optimized for gull-wing and straight lead versions
- 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 790 MHz to 960 MHz frequency range

## 2. Pinning information

**Table 2. Pinning**

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| **BLF8G10LS-270V (SOT1244B)** | | | |
| 1 | drain |  |  |
| 2 | gate | | |
| 3 | source [1] | | |
| 4 | decoupling lead | | |
| 5 | decoupling lead | | |
| 6 | n.c. | | |
| 7 | n.c. | | |
| **BLF8G10LS-270GV (SOT1244C)** | | | |
| 1 | drain |  |  |
| 2 | gate | | |
| 3 | source [1] | | |
| 4 | decoupling lead | | |
| 5 | decoupling lead | | |
| 6 | n.c. | | |
| 7 | n.c. | | |



[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BLF8G10LS-270V | - | earless flanged ceramic package; 6 leads | SOT1244B |
| BLF8G10LS-270GV | - | earless flanged ceramic package; 6 leads | SOT1244C |

## 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 | | - | 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 °C; $P_L$ = 67 W | 0.257 | K/W |

# 6. Characteristics

**Table 6. DC characteristics**

*$T_j$ = 25 °C; per section unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS}$ = 0 V; $I_D$ = 4.5 mA | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS}$ = 10 V; $I_D$ = 450 mA | 1.5 | 1.8 | 2.3 | V |
| $I_{DSS}$ | drain leakage current | $V_{GS}$ = 0 V; $V_{DS}$ = 28 V | - | - | 4.2 | μA |
| $I_{DSX}$ | drain cut-off current | $V_{GS}$ = $V_{GS(th)}$ + 3.75 V; $V_{DS}$ = 10 V | - | 82 | - | A |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = 11 V; $V_{DS}$ = 0 V | - | - | 420 | nA |
| $g_{fs}$ | forward transconductance | $V_{DS}$ = 10 V; $I_D$ = 450 mA | - | 3.92 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS}$ = $V_{GS(th)}$ + 3.75 V; $I_D$ = 15.75 A | - | 0.04 | - | Ω |

**Table 7. RF characteristics**

*Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 1-64 DPCH; $f_1$ = 871.5 MHz; $f_2$ = 881.5 MHz; $f_3$ = 881.5 MHz; $f_4$ = 891.5 MHz; $f_5$ = 881.5 MHz; $f_6$ = 891.5 MHz; RF performance at $V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA; $T_{case}$ = 25 °C; unless otherwise specified; in a class-AB production test circuit, tested on straight lead device.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $G_p$ | power gain | $P_{L(AV)}$ = 67 W | 17.3 | 19.5 | - | dB |
| $RL_{in}$ | input return loss | $P_{L(AV)}$ = 67 W | - | –16 | –12 | dB |
| $\eta_D$ | drain efficiency | $P_{L(AV)}$ = 67 W | 26 | 31 | - | % |
| $ACPR_{5M}$ | adjacent channel power ratio (5 MHz) | $P_{L(AV)}$ = 67 W | - | –37 | –33 | dBc |

# 7. Test information

## 7.1 Ruggedness in class-AB operation

The BLF8G10LS-270V and BLF8G10LS-270GV are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA; $P_L$ = 270 W; f = 820 MHz; f = 869 MHz; f = 920 MHz; f = 960 MHz and a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions: $V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA; $P_L$ = 270 W; f = 790 MHz.

## 7.2 Impedance information

**Table 8. Typical impedance**

*$I_{Dq}$ = 2700 mA; main transistor $V_{DS}$ = 28 V.*

| f | $Z_S$[1] | $Z_L$[1] |
|---|---|---|
| (MHz) | (Ω) | (Ω) |
| 790 | 1.4 – j1.84 | 1.22 – j2.07 |
| 820 | 1.58 – j1.96 | 1.29 – j1.95 |
| 869 | 1.84 – j2.70 | 1.12 – j1.83 |
| 881 | 1.78 – j2.94 | 1.12 – j1.84 |
| 894 | 1.90 – j3.08 | 1.12 – j1.84 |
| 920 | 2.06 – j2.50 | 1.04 – j1.13 |
| 940 | 2.10 – j2.90 | 1.04 – j1.13 |
| 960 | 2.56 – j2.65 | 1.00 – j1.22 |

[1] $Z_S$ and $Z_L$ defined in Figure 1.

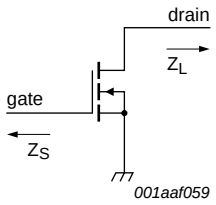
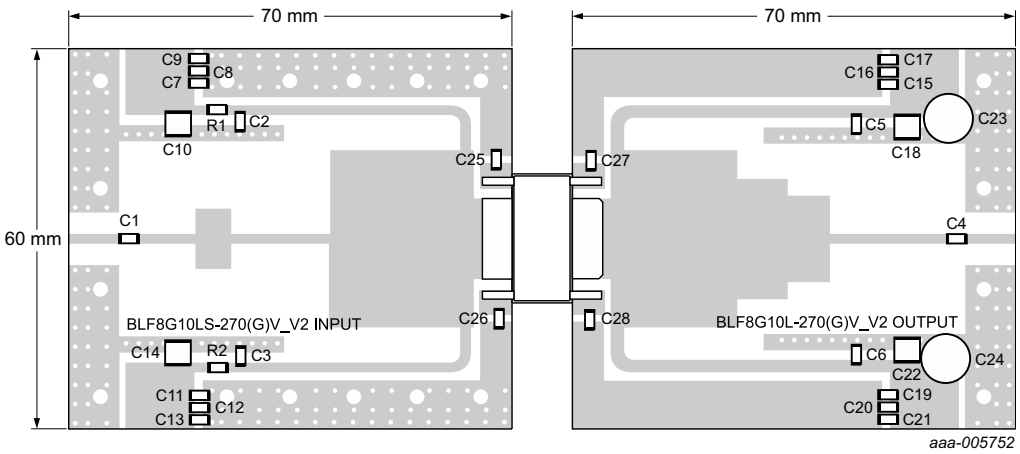



**Fig 1. Definition of transistor impedance**

## 7.3 VBW in class-AB operation

The BLF8G10LS-270V and BLF8G10LS-270GV show 55 MHz (typical) video bandwidth in class-AB test circuit in 800 MHz band at $V_{DS}$ = 28 V and $I_{Dq}$ = 2 A.

## 7.4 Test circuit




Printed-Circuit Board (PCB): Rogers 4350B; $\varepsilon_r$ = 3.66; 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, C4 | multilayer ceramic chip capacitor | 47 pF | [1] | ATC100B |
| C2, C3, C5, C6 | multilayer ceramic chip capacitor | 45 pF | [1] | ATC100B |
| C7, C11, C15, C19 | multilayer ceramic chip capacitor | 0.01 μF | [2] | Murata |
| C8, C12, C16, C20 | multilayer ceramic chip capacitor | 0.1 μF | [2] | Murata |
| C9, C13, C17, C21 | multilayer ceramic chip capacitor | 1 μF | [2] | Murata |
| C10, C14, C18, C22 | multilayer ceramic chip capacitor | 4.7 μF | [2] | Murata |
| C23, C24 | electrolytic capacitor | 470 μF, 63 V | | |
| C25, C26, C27, C28 | multilayer ceramic chip capacitor | 10 μF | [2] | Murata |
| R1, R2 | chip resistor | 9.1 Ω | [3] | Vishay Dale 0805 |

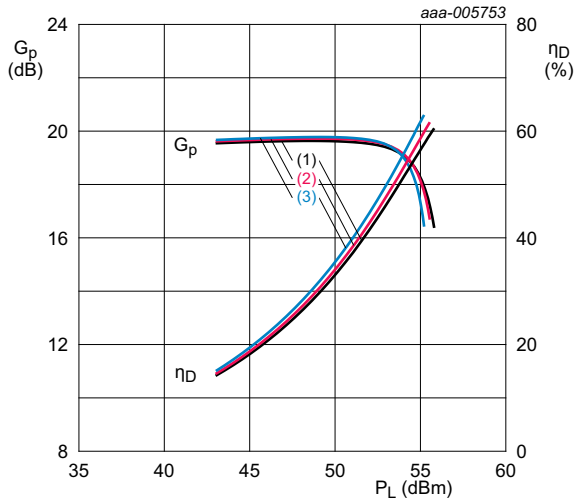
[1] American Technical Ceramics type 100B or capacitor of same quality.

[2] Murata or capacitor of same quality.

[3] Vishay Dale resistor of same quality.

## 7.5 Graphical data

### 7.5.1 Straight lead sample CW




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

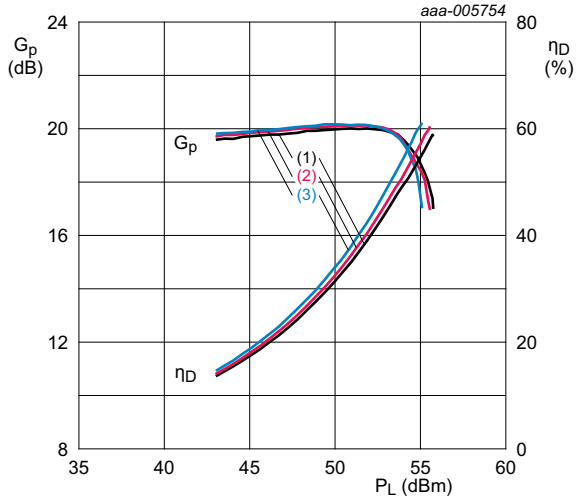
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 3. Power gain and drain efficiency as function of load power; typical values**

### 7.5.2 Straight lead sample CW pulsed




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

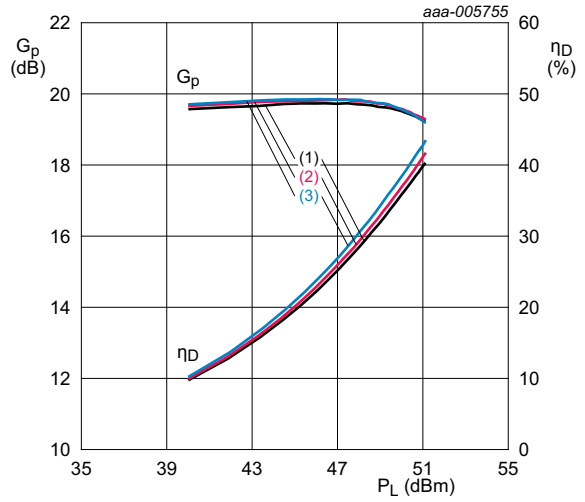
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

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

### 7.5.3 Straight lead sample 1-carrier W-CDMA



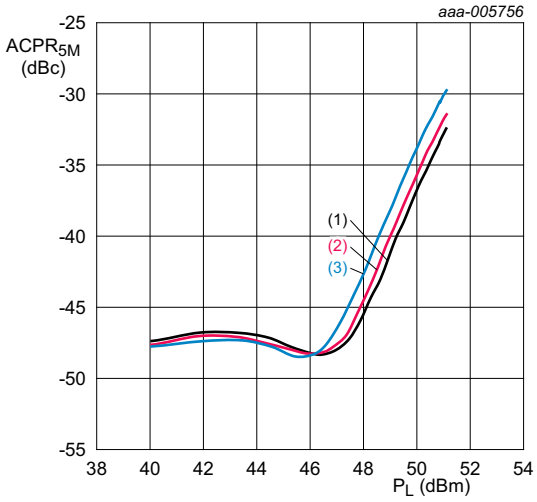

$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 5. Power gain and drain efficiency as function of load power; typical values**



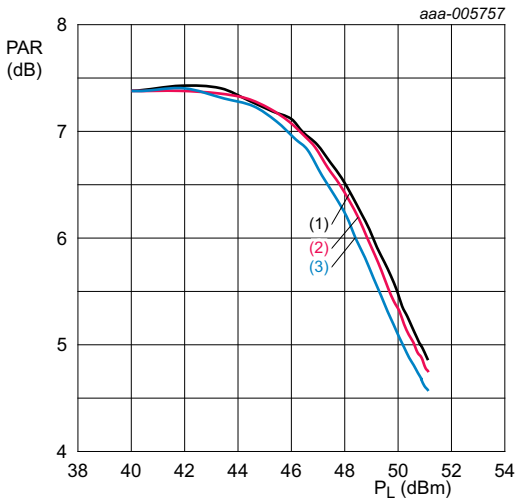

$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 6. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

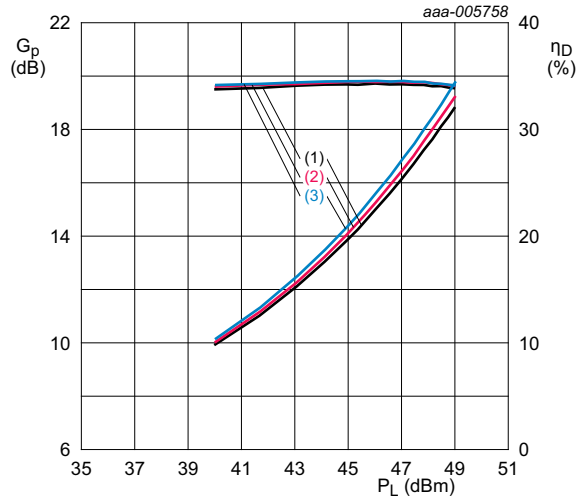
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 7. Peak-to-average ratio as a function of load power; typical values**

### 7.5.4 Straight lead sample 2-carrier W-CDMA



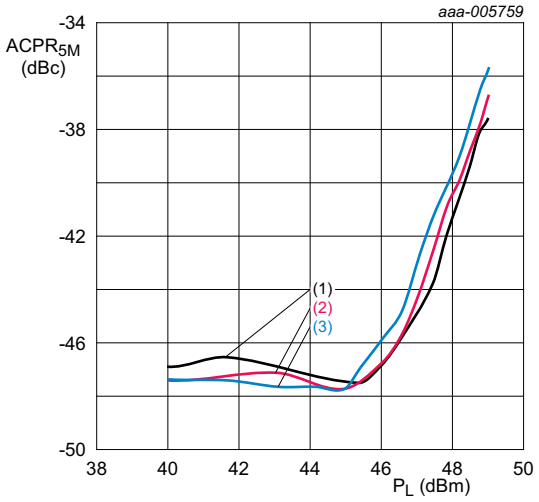

$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 8. Power gain and drain efficiency as function of load power; typical values**




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

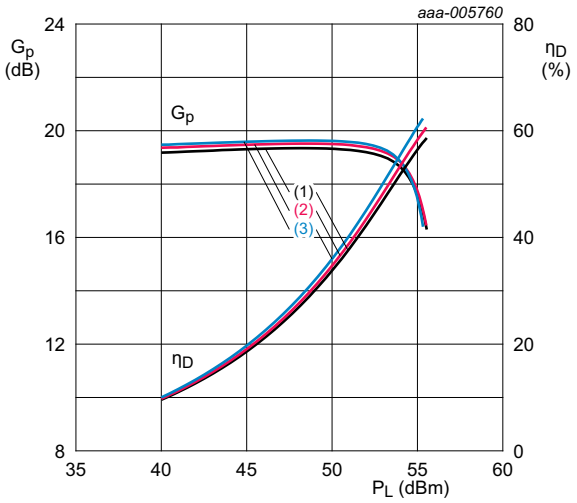
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 9. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**

### 7.5.5 Gull-wing sample CW




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

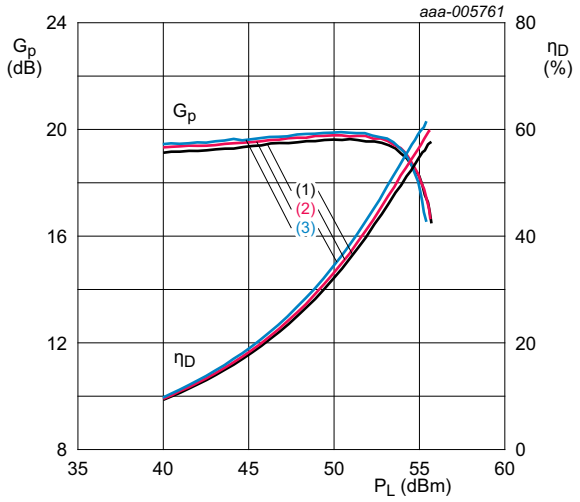
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 10. Power gain and drain efficiency as function of load power; typical values**

### 7.5.6 Gull-wing sample CW pulsed




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

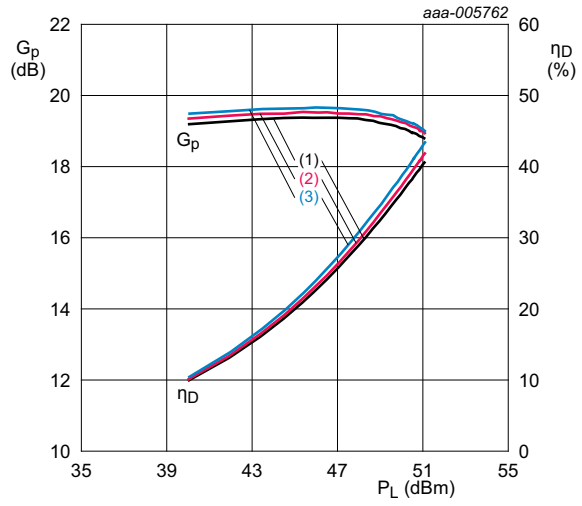
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 11. Power gain and drain efficiency as function of load power; typical values**

### 7.5.7 Gull-wing sample 1-carrier W-CDMA



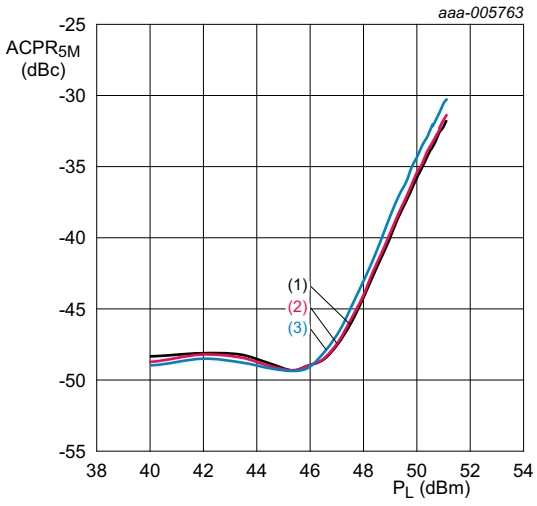

$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 12. Power gain and drain efficiency as function of load power; typical values**



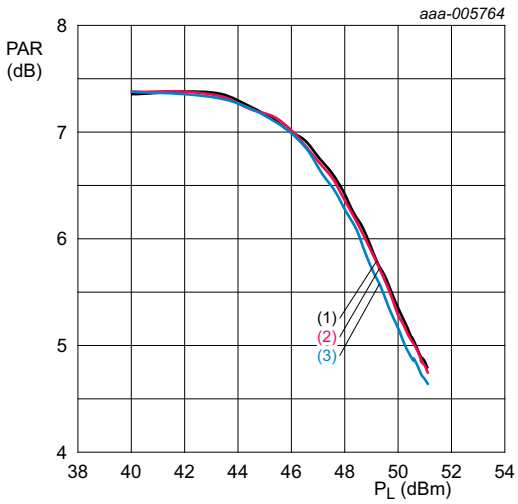

$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 13. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

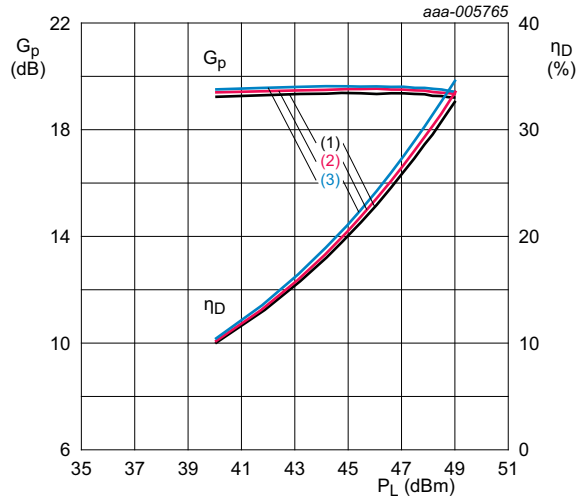
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 14. Peak-to-average ratio as a function of load power; typical values**

### 7.5.8 Gull-wing sample 2-carrier W-CDMA



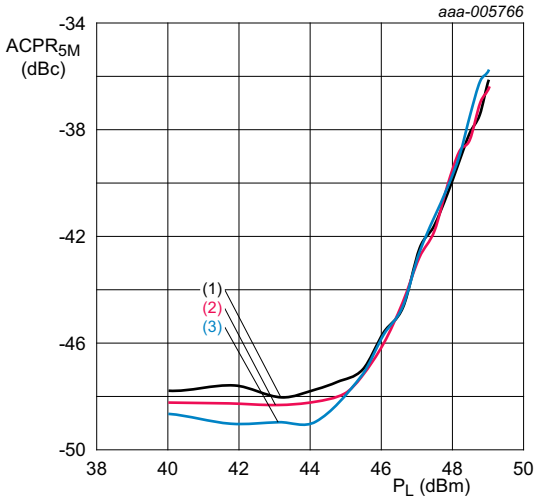

$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 15. Power gain and drain efficiency as function of load power; typical values**




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA

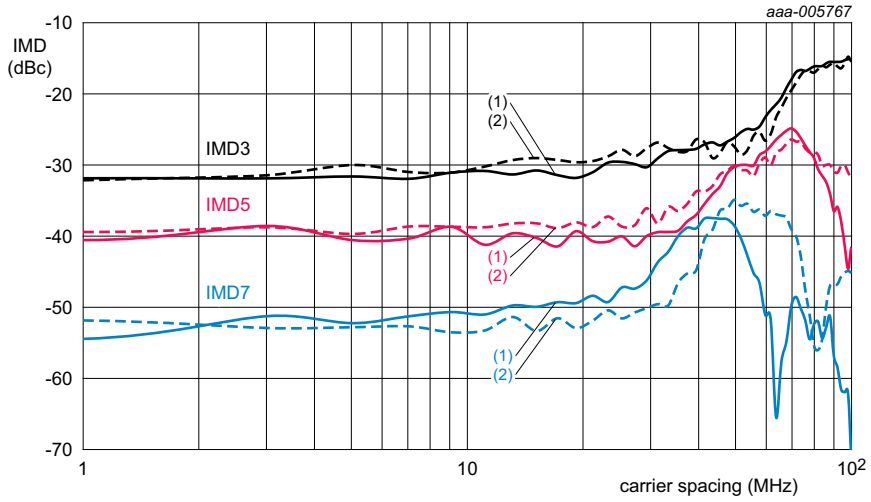
(1) f = 869 MHz

(2) f = 881.5 MHz

(3) f = 894 MHz

**Fig 16. Adjacent channel power ratio (5 MHz) as a function of load power; typical values**

### 7.5.9 2-Tone VBW




$V_{DS}$ = 28 V; $I_{Dq}$ = 2000 mA; f = 881.5 MHz.

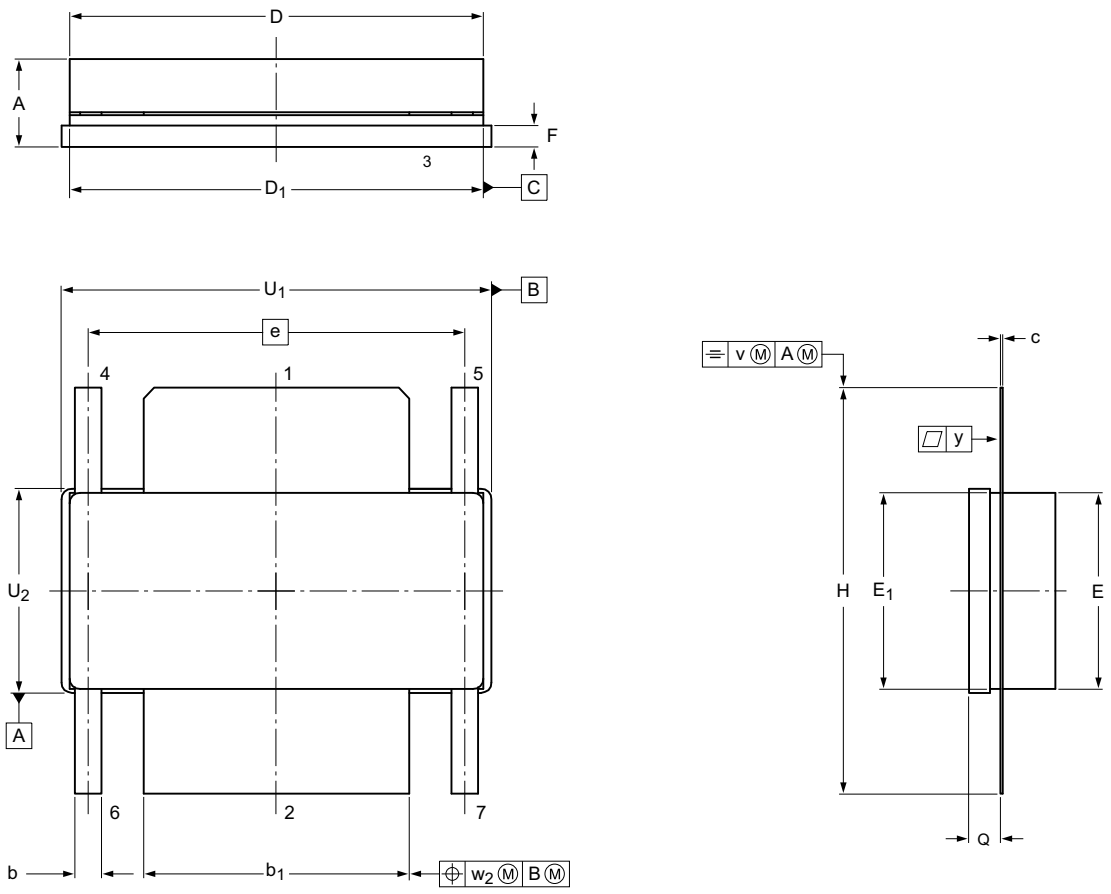
(1) IMD low

(2) IMD high

**Fig 17. VBW capability in class-AB test circuit**

# 8. Package outline

**Earless flanged ceramic package; 6 leads** **SOT1244B**




Dimensions

| Unit[1] | | A | b | $b_1$ | c | D | $D_1$ | e | E | $E_1$ | F | H | Q[2] | $U_1$ | $U_2$ | v | $w_2$ | y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 4.75 | 1.41 | 12.83 | 0.18 | 20.02 | 19.96 | | 9.53 | 9.53 | 1.14 | 19.94 | 1.70 | 20.70 | 9.91 | 0.25 | 0.25 | 0.25 |
| | nom | | | | | | | 18.03 | | | | | | | | | | |
| | min | 3.45 | 1.14 | 12.57 | 0.10 | 19.61 | 19.66 | | 9.27 | 9.27 | 0.89 | 18.92 | 1.45 | 20.45 | 9.65 | | | |
| inches | max | 0.187 | 0.055 | 0.505 | 0.007 | 0.788 | 0.786 | | 0.375 | 0.375 | 0.045 | 0.785 | 0.067 | 0.815 | 0.39 | 0.01 | 0.01 | 0.01 |
| | nom | | | | | | | 0.710 | | | | | | | | | | |
| | min | 0.136 | 0.045 | 0.495 | 0.004 | 0.772 | 0.774 | | 0.365 | 0.365 | 0.035 | 0.745 | 0.057 | 0.805 | 0.38 | | | |

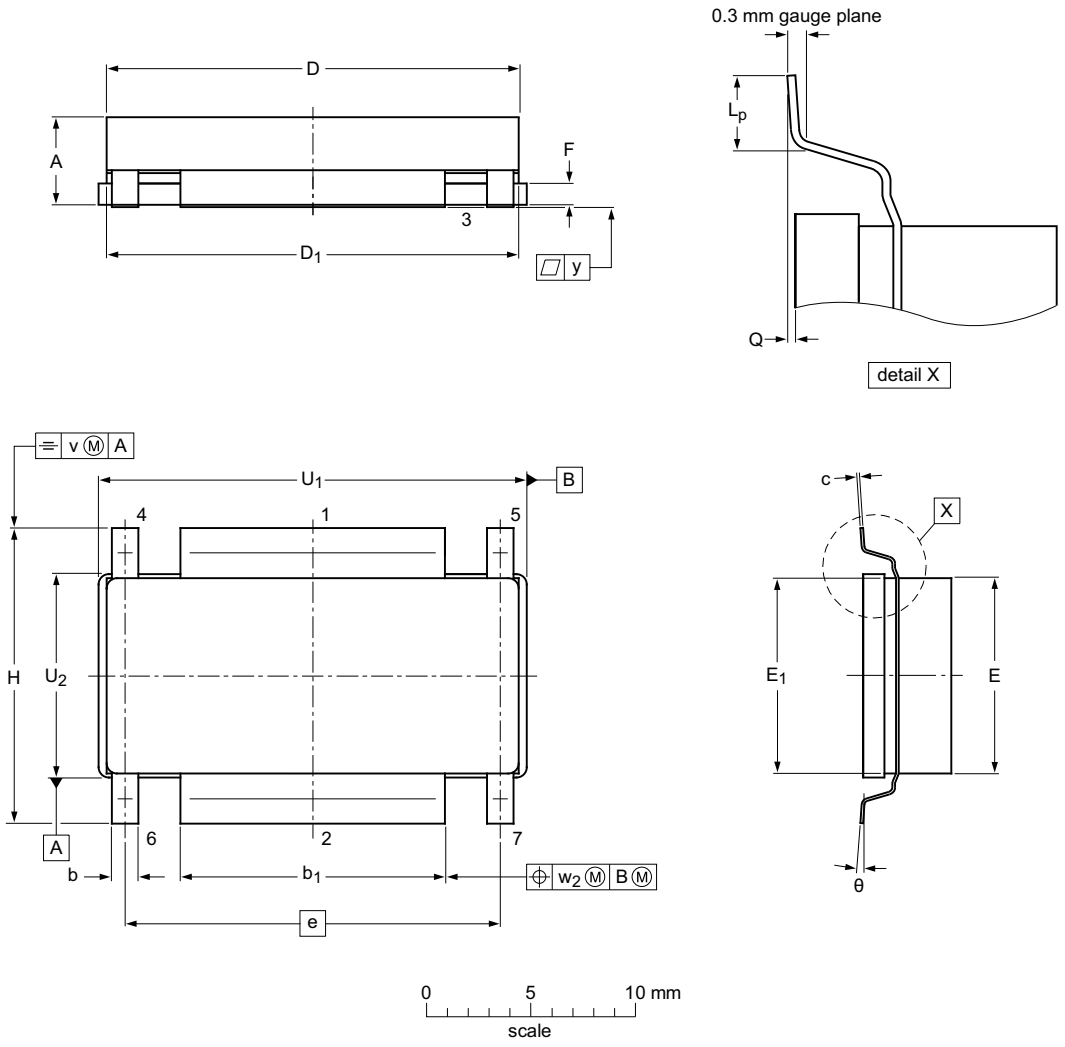
Note
1. Millimeter dimensions are derived from the original inch dimensions.
2. Dimension is measured 0.030 inch (0.76 mm) from body.

*sot1244b_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1244B | | | | | | ~~12-04-18~~ 12-05-07 |

**Fig 18. Package outline SOT1244B**

**Earless flanged ceramic package; 6 leads** **SOT1244C**




Dimensions

| Unit[1] | | A | b | $b_1$ | c | D | $D_1$ | e | E | $E_1$ | F | H | $L_p$ | Q | $U_1$ | $U_2$ | v | $w_2$ | y | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 4.75 | 1.41 | 12.83 | 0.18 | 20.02 | 19.96 | | 9.53 | 9.53 | 1.14 | 14.3 | 1.38 | 0.195 | 20.70 | 9.91 | 0.25 | 0.25 | 0.15 | 7° |
| | nom | | | | | | | 18.03 | | | | | | | | | | | | |
| | min | 3.45 | 1.14 | 12.57 | 0.10 | 19.61 | 19.66 | | 9.27 | 9.27 | 0.89 | 14.1 | 0.98 | 0.055 | 20.45 | 9.65 | | | | 0° |
| inches | max | 0.187 | 0.055 | 0.505 | 0.007 | 0.788 | 0.786 | | 0.375 | 0.375 | 0.045 | 0.563 | 0.055 | 0.008 | 0.815 | 0.39 | 0.01 | 0.01 | 0.006 | 7° |
| | nom | | | | | | | 0.710 | | | | | | | | | | | | |
| | min | 0.136 | 0.045 | 0.495 | 0.004 | 0.772 | 0.774 | | 0.365 | 0.365 | 0.035 | 0.555 | 0.039 | 0.002 | 0.805 | 0.38 | | | | 0° |

Note

1. Millimeter dimensions are derived from the original inch dimensions.

*sot1244c_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1244C | | | | | | ~~12-05-10~~ 12-05-30 |

**Fig 19. Package outline SOT1244C**

## 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 |
| IMD | InterModulation Distortion |
| LDMOS | Laterally Diffused Metal Oxide Semiconductor |
| PAR | Peak-to-Average Ratio |
| VBW | Video BandWidth |
| 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 |
|---|---|---|---|---|
| BLF8G10LS-270V_8G10LS-270GV v.1 | 20121203 | Product 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".

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## 14. Contents





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