

BLF6G10LS-200R

Power LDMOS transistor

Rev. 01 — 21 January 2008

Preliminary data sheet

1. Product profile

1.1 General description

200 W LDMOS power transistor for base station applications at frequencies from 800 MHz to 1000 MHz.

Table 1. Typical performance

Typical RF performance at $T_{case} = 25\text{ }^{\circ}\text{C}$ 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 (dBc) |
|-------------------|------------|------------------------|---------------------------|------------------------|-----------------|--------------------|
| 2-carrier W-CDMA | 869 to 894 | 28 | 40 | 20 | 27.5 | -40 ^[1] |

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.5 dB at 0.01 % probability on CCDF per carrier; carrier spacing 5 MHz.

CAUTION



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

1.2 Features

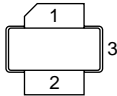
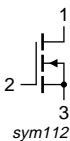
- Typical 2-carrier W-CDMA performance at frequencies of 869 MHz and 894 MHz, a supply voltage of 28 V and an I_{DQ} of 1400 mA:
 - ◆ Average output power = 40 W
 - ◆ Power gain = 20 dB
 - ◆ Efficiency = 27.5 %
 - ◆ ACPR = -40 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (800 MHz to 1000 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 GSM, GSM EDGE, W-CDMA and CDMA base stations and multi carrier applications in the 800 MHz to 1000 MHz frequency range.

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Symbol |
|-----|-------------|---|---|
| 1 | drain |  |  |
| 2 | gate | | |
| 3 | source | | |

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|----------------|---------|---|---------|
| | Name | Description | Version |
| BLF6G10LS-200R | - | 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 | | - | 49 | 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 |
|------------------|--|---|------|------|
| $R_{th(j-case)}$ | thermal resistance from junction to case | $T_{case} = 80\text{ °C}$; $P_L = 40\text{ W}$ | 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 | $V_{GS} = 0\text{ V}; I_D = 0.9\text{ mA}$ | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS} = 10\text{ V}; I_D = 270\text{ mA}$ | 1.4 | 2.0 | 2.4 | V |
| V_{GSq} | gate-source quiescent voltage | $V_{DS} = 28\text{ V};$ $I_D = 1620\text{ mA}$ | 1.7 | 2.2 | 2.7 | V |
| I_{DSS} | drain leakage current | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$ | - | - | 4.2 | μA |
| I_{DSX} | drain cut-off current | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$ | 40 | 48 | - | A |
| I_{GSS} | gate leakage current | $V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$ | - | - | 420 | nA |
| g_{fs} | forward transconductance | $V_{DS} = 10\text{ V}; I_D = 9.45\text{ A}$ | 11 | 18 | 26 | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 9.45\text{ A}$ | 0.012 | 0.07 | 0.093 | Ω |
| C_{rs} | feedback capacitance | $V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V};$ $f = 1\text{ MHz}$ | - | 3 | - | pF |

7. Application information

Table 7. Application information

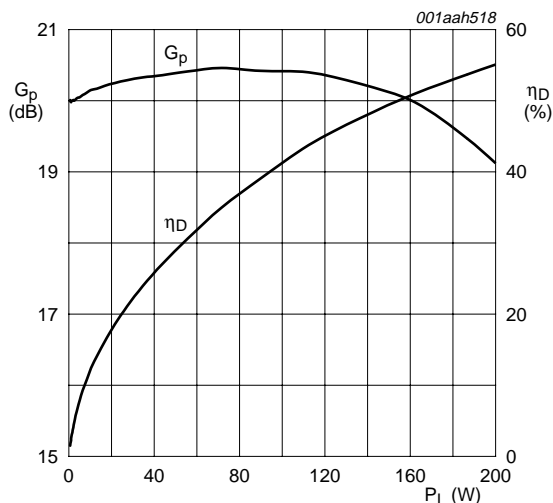
Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; $f_1 = 871.5\text{ MHz}$; $f_2 = 876.5\text{ MHz}$; $f_3 = 886.5\text{ MHz}$; $f_4 = 891.5\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}$; $I_{Dq} = 1400\text{ mA}$; $T_{case} = 25\text{ }^{\circ}\text{C}$; unless otherwise specified; in a class-AB production test circuit.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-------------|------------------------------|---------------------------|-----|-------|-------|------|
| $P_{L(AV)}$ | average output power | | - | 40 | - | W |
| G_p | power gain | $P_{L(AV)} = 40\text{ W}$ | 19 | 20 | 21 | dB |
| IRL | input return loss | $P_{L(AV)} = 40\text{ W}$ | - | -6.7 | -5.0 | dB |
| η_D | drain efficiency | $P_{L(AV)} = 40\text{ W}$ | 25 | 27.5 | - | % |
| ACPR | adjacent channel power ratio | $P_{L(AV)} = 40\text{ W}$ | - | -40.5 | -38.0 | dBc |

7.1 Ruggedness in class-AB operation

The BLF6G10LS-200R is an enhanced rugged device and is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28\text{ V}$; $I_{Dq} = 1400\text{ mA}$; $P_L = 200\text{ W}$; $f = 894\text{ MHz}$.

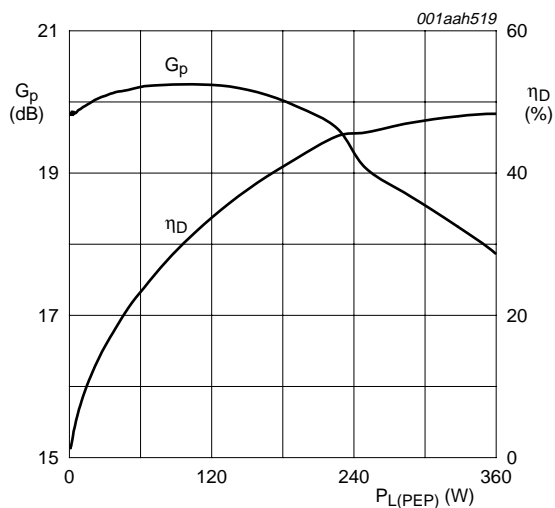
7.2 One-tone CW



$V_{DS} = 28$ V; $I_{DQ} = 1400$ mA; $f = 881$ MHz.

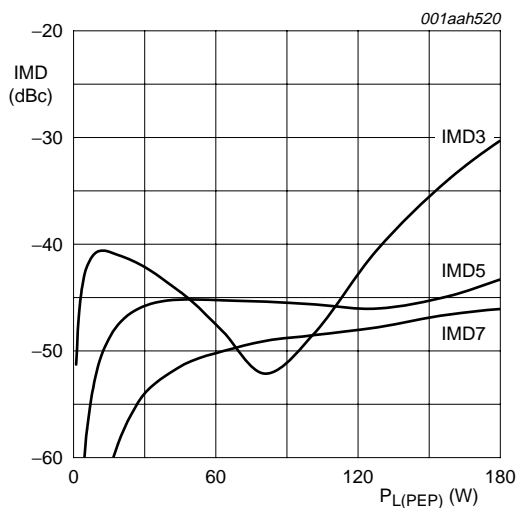
Fig 1. One-tone CW power gain and drain efficiency as functions of load power; typical values

7.3 Two-tone CW



$V_{DS} = 28$ V; $I_{DQ} = 1400$ mA; $f = 881$ MHz (± 100 kHz).

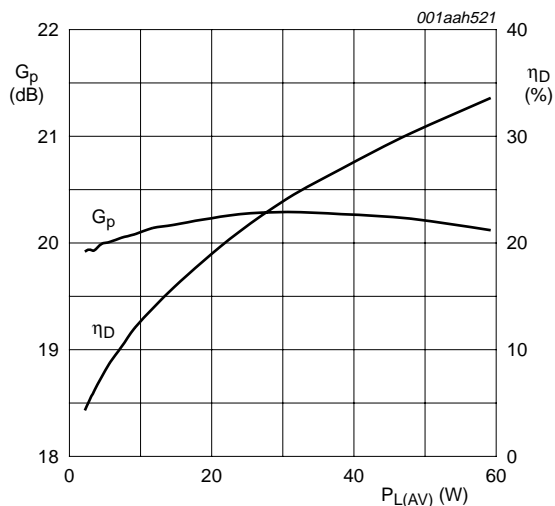
Fig 2. Two-tone CW power gain and drain efficiency as functions of peak envelope load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 1400$ mA; $f = 881$ MHz (± 100 kHz).

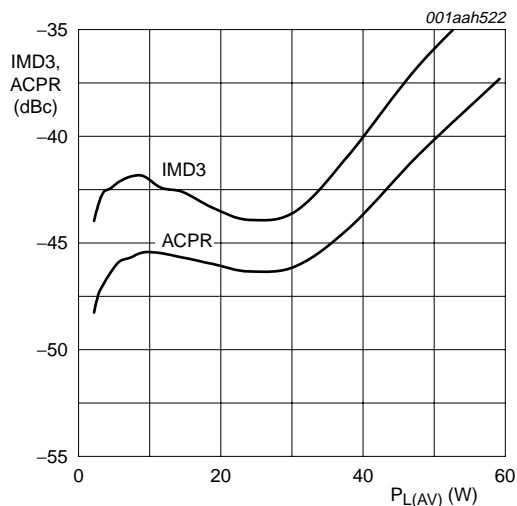
Fig 3. Two-tone CW intermodulation distortion as function of peak envelope load power; typical values

7.4 2-carrier W-CDMA



$V_{DS} = 28$ V; $I_{DQ} = 1400$ mA; $f = 881$ MHz (± 5 MHz);
carrier spacing 10 MHz.

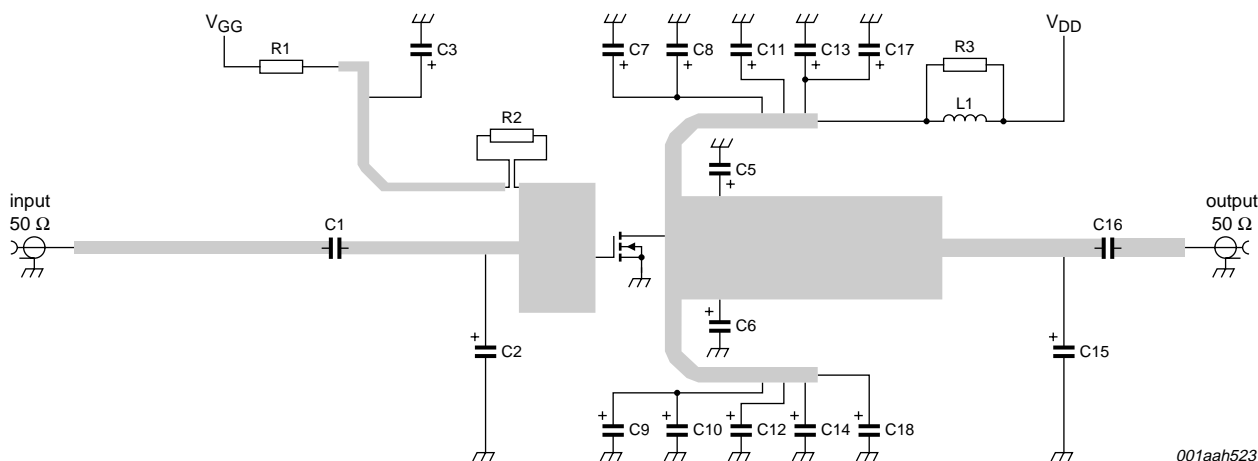
Fig 4. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values



$V_{DS} = 28$ V; $I_{DQ} = 1400$ mA; $f = 881$ MHz (± 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



The drawing is not to scale.

Fig 6. Test circuit for operation at 800 MHz

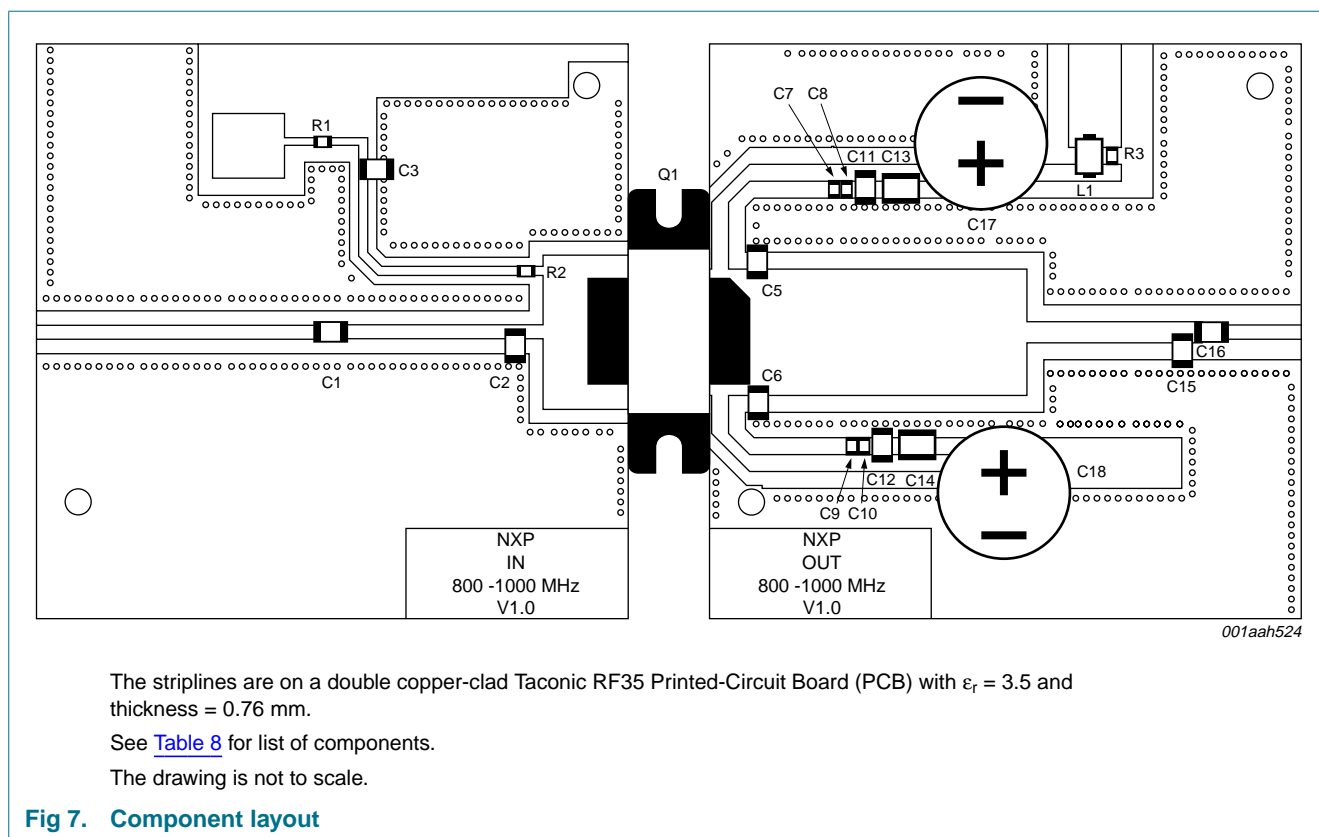


Table 8. List of components (see [Figure 6](#) and [Figure 7](#))

All capacitors should be soldered vertically except C20.

| Component | Description | Value | Remarks |
|-----------------------|-----------------------------------|----------------------|--|
| C1, C3, C11, C12, C16 | multilayer ceramic chip capacitor | 68 pF | [1] solder vertically |
| C2 | multilayer ceramic chip capacitor | 13 pF | [1] solder vertically |
| C5, C6 | multilayer ceramic chip capacitor | 10 pF | [1] solder vertically |
| C7, C8, C9, C10 | Electrolytic capacitor | 220 nF | Vishay VJ1206Y224KXB |
| C13, C14 | multilayer ceramic chip capacitor | 4.7 μ F; 50 V | [2] |
| C15 | multilayer ceramic chip capacitor | 1.5 pF | [1] solder vertically |
| C17, C18 | Electrolytic capacitor | 220 μ F; 63 V | |
| L1 | Ferrite SMD bead | - | Ferroxcube BDS 3/3/4.6-4S2 or equivalent |
| Q1 | BLF6G10LS-200R | - | |
| R1, R2, R3 | SMD resistor | 9.1 Ω ; 0.1 W | |

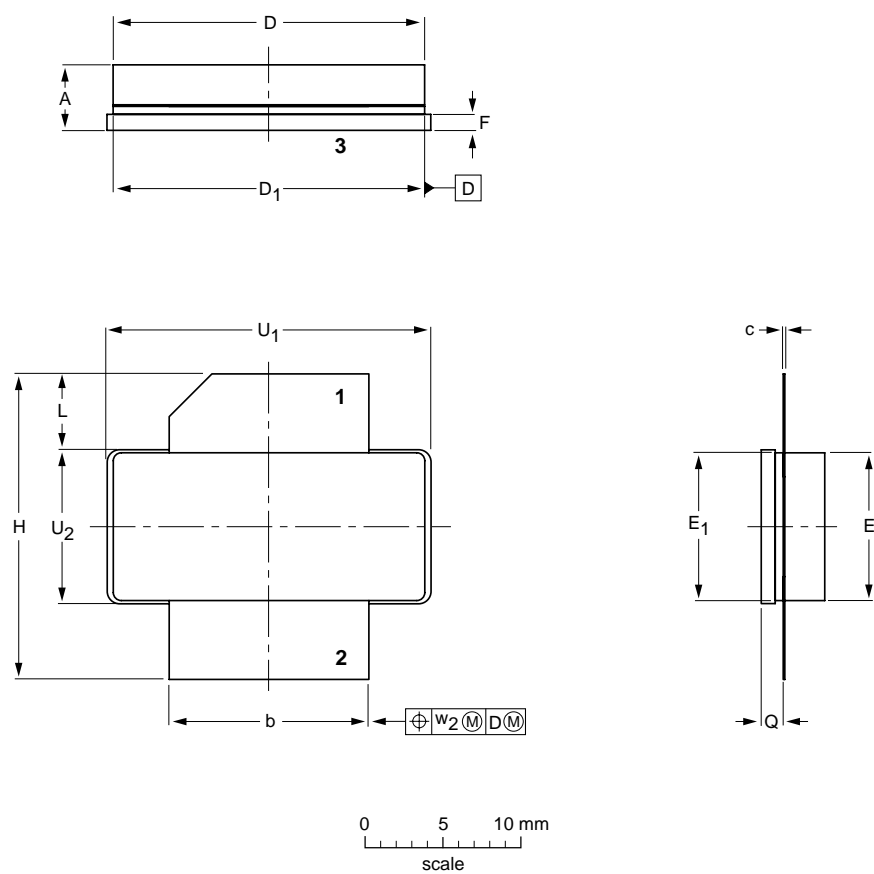
[1] American Technical Ceramics type 100B or capacitor of same quality.

[2] TDK or capacitor of same quality.

9. Package outline

Earless flanged LDMOST ceramic package; 2 leads

SOT502B



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

| UNIT | A | b | c | D | D ₁ | E | E ₁ | F | H | L | Q | U ₁ | U ₂ | w ₂ |
|--------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| mm | 4.72 3.43 | 12.83 12.57 | 0.15 0.08 | 20.02 19.61 | 19.96 19.66 | 9.50 9.30 | 9.53 9.25 | 1.14 0.89 | 19.94 18.92 | 5.33 4.32 | 1.70 1.45 | 20.70 20.45 | 9.91 9.65 | 0.25 |
| inches | 0.186 0.135 | 0.505 0.495 | 0.006 0.003 | 0.788 0.772 | 0.786 0.774 | 0.374 0.366 | 0.375 0.364 | 0.045 0.035 | 0.785 0.745 | 0.210 0.170 | 0.067 0.057 | 0.815 0.805 | 0.390 0.380 | 0.010 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|--------------------|------------|-------|-------|--|------------------------|----------------------|
| | IEC | JEDEC | JEITA | | | |
| SOT502B | | | | | | 03-01-10 07-05-09 |

Fig 8. Package outline SOT502B

10. Abbreviations

Table 9. Abbreviations

| Acronym | Description |
|---------|---|
| 3GPP | Third Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CDMA | Code Division Multiple Access |
| CW | Continuous Wave |
| DPCH | Dedicated Physical CHannel |
| EDGE | Enhanced Data rates for GSM Evolution |
| GSM | Global System for Mobile communications |
| LDMOS | Laterally Diffused Metal Oxide Semiconductor |
| LDMOST | Laterally Diffused Metal-Oxide Semiconductor Transistor |
| 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 |
|------------------|--------------|------------------------|---------------|------------|
| BLF6G10LS-200R_1 | 20080121 | Preliminary data sheet | - | - |

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12.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
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[2] The term 'short data sheet' is explained in section "Definitions".

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14. Contents

| | | |
|-----------|--|-----------|
| 1 | Product profile | 1 |
| 1.1 | General description | 1 |
| 1.2 | Features | 1 |
| 1.3 | Applications | 2 |
| 2 | Pinning information | 2 |
| 3 | Ordering information | 2 |
| 4 | Limiting values | 2 |
| 5 | Thermal characteristics | 2 |
| 6 | Characteristics | 3 |
| 7 | Application information | 3 |
| 7.1 | Ruggedness in class-AB operation | 3 |
| 7.2 | One-tone CW | 4 |
| 7.3 | Two-tone CW | 4 |
| 7.4 | 2-carrier W-CDMA | 5 |
| 8 | Test information | 5 |
| 9 | Package outline | 7 |
| 10 | Abbreviations | 8 |
| 11 | Revision history | 8 |
| 12 | Legal information | 9 |
| 12.1 | Data sheet status | 9 |
| 12.2 | Definitions | 9 |
| 12.3 | Disclaimers | 9 |
| 12.4 | Trademarks | 9 |
| 13 | Contact information | 9 |
| 14 | Contents | 10 |

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