# BLP7G10S-160P

**Power LDMOS transistor**

**Rev. 1 — 30 August 2018**

AMPLEON

**Product data sheet**

## 1. Product profile

### 1.1 General description

160 W LDMOS power transistor for base station applications at frequencies from 600 MHz to 960 MHz.

**Table 1. Typical performance**

*RF performance at $T_h$ = 25 °C in a common source test circuit.*

| Test signal | f | $V_{DS}$ | $I_{Dq}$ | $P_{L(AV)}$ | $P_{L(1dB)}$ | $G_p$ | $\eta_D$ |
|---|---|---|---|---|---|---|---|
| | (MHz) | (V) | (mA) | (W) | (W) | (dB) | (%) |
| pulsed, class-AB | 860 | 28 | 100 | - | 160 | 20 | 62 |

### 1.2 Features and benefits

- Integrated ESD protection
- Excellent ruggedness
- High power gain
- High efficiency
- Excellent reliability
- Easy power control
- For RoHS compliance see the product details on the Ampleon website

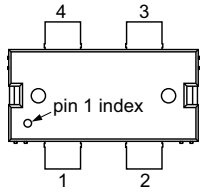
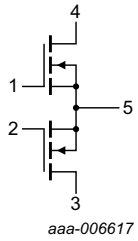
### 1.3 Applications

- RF power amplifiers for base stations and multi carrier applications in the 600 MHz to 960 MHz frequency range

## 2. Pinning information

**Table 2. Pinning**

*All pins must be connected for correct operation and to prevent damage to the device.*

| Pin | Description | Simplified outline | Graphic symbol |
|---|---|---|---|
| 1 | gate 1 |  |  |
| 2 | gate 2 | | |
| 3 | drain 2 | | |
| 4 | drain 1 | | |
| 5 | source [1] | | |





[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BLP7G10S-160P | HSOP4F | plastic, heatsink small outline package; 4 leads (flat) | SOT1223-2 |

## 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 | | –6 | +11 | 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, for details refer to the online MTF calculator.

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

| Symbol | Parameter | Conditions | Typ | Unit |
|---|---|---|---|---|
| $R_{th(j\text{-}case)}$ | thermal resistance from junction to case | $T_{case}$ = 80 °C; $P_L$ = 160 W [1] | 0.5 | K/W |

[1] $R_{th(j\text{-}case)}$ is measured under RF conditions.


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# 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; $I_D$ = 0.9 mA | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS}$ = 10 V; $I_D$ = 90 mA | 1.5 | 1.86 | 2.3 | V |
| $I_{DSS}$ | drain leakage current | $V_{GS}$ = 0 V; $V_{DS}$ = 28 V | −1.4 | - | +1.4 | μA |
| $I_{DSX}$ | drain cut-off current | $V_{GS}$ = $V_{GS(th)}$ + 3.75 V; $V_{DS}$ = 10 V | 15 | 16 | - | A |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = 11 V; $V_{DS}$ = 0 V | - | - | 140 | nA |
| $g_{fs}$ | forward transconductance | $V_{DS}$ = 10 V; $I_D$ = 3.15 A | - | 6 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS}$ = $V_{GS(th)}$ + 3.75 V; $I_D$ = 3.15 A | - | 0.2 | - | Ω |

**Table 7. AC characteristics**

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $C_{iss}$ | input capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 28 V; f = 1 MHz | - | 79 | - | pF |
| $C_{oss}$ | output capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 28 V; f = 1 MHz | - | 32 | - | pF |
| $C_{rs}$ | feedback capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 28 V; f = 1 MHz | - | 1.5 | - | pF |

**Table 8. RF characteristics**

*Test signal: pulsed CW; f = 860 MHz; RF performance measured at $V_{DS}$ = 28 V; $I_{Dq}$ = 100 mA; $T_{case}$ = 25 °C; unless otherwise specified; in a class-AB production test circuit.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $G_p$ | power gain | $P_{L(1dB)}$ = 160 W | 16.5 | 19.4 | - | dB |
| $\eta_D$ | drain efficiency | $P_{L(1dB)}$ = 160 W | 57.5 | 59.7 | - | % |

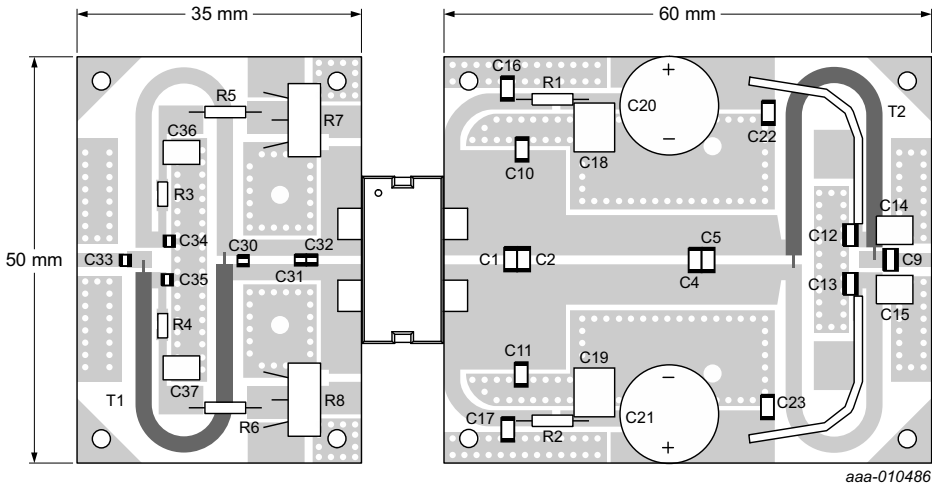
# 7. Test information

## 7.1 Ruggedness in class-AB operation

The BLP7G10S-160P is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS}$ = 28 V; f = 860 MHz at rated load power.


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## 7.2 Demo circuit information




Printed-Circuit Board (PCB): Taconic RF35; $\varepsilon_r$ = 3.5; thickness = 0.76 mm; thickness copper plating = 35 μm.

See Table 9 for a list of components.

**Fig 1. Component layout for class-AB production test circuit**

**Table 9. List of components**

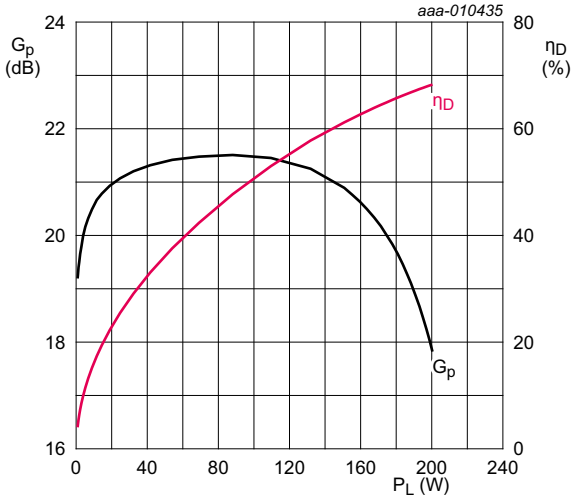
*For test circuit see Figure 1.*

| Component | Description | Value | Remarks |
|---|---|---|---|
| C1, C2 | multilayer ceramic chip capacitor | 5.6 pF | ATC800B |
| C4, C5 | multilayer ceramic chip capacitor | 4.7 pF | ATC800B |
| C9 | multilayer ceramic chip capacitor | 100 pF | ATC180R |
| C10, C11 | multilayer ceramic chip capacitor | 10 pF | ATC800B |
| C12, C13 | multilayer ceramic chip capacitor | 100 pF | ATC180R |
| C14, C15 | multilayer ceramic chip capacitor | 4.7 μF, 50 V | TDK |
| C16, C17 | multilayer ceramic chip capacitor | 100 pF | ATC800B |
| C18, C19 | multilayer ceramic chip capacitor | 10 μF | TDK |
| C20, C21 | electrolytic capacitor | 470 μF, 63 V | |
| C22, C23 | multilayer ceramic chip capacitor | 1 nF | ATC800B |
| C30 | multilayer ceramic chip capacitor | 33 pF | ATC800A |
| C31 | multilayer ceramic chip capacitor | 10 pF | ATC800A |
| C32 | multilayer ceramic chip capacitor | 11 pF | ATC800A |
| C33, C34, C35 | multilayer ceramic chip capacitor | 91 pF | ATC800A |
| C36, C37 | electrolytic capacitor | 4.7 μF, 50 V | |
| T1 | semi rigid coax | 25 Ω | Micro-Coax: UT-090C-25 |
| T2 | semi rigid coax | 25 Ω | Micro-Coax: UT-090C-25 |
| R1, R2 | resistor | 10 Ω | Vishay: MRS25 |
| R3, R4 | resistor | 5.6 Ω | SMD 1206 |
| R5, R6 | resistor | 100 Ω | Vishay: MRS25 |
| R7, R8 | potentiometer | 10 kΩ | Bourns |


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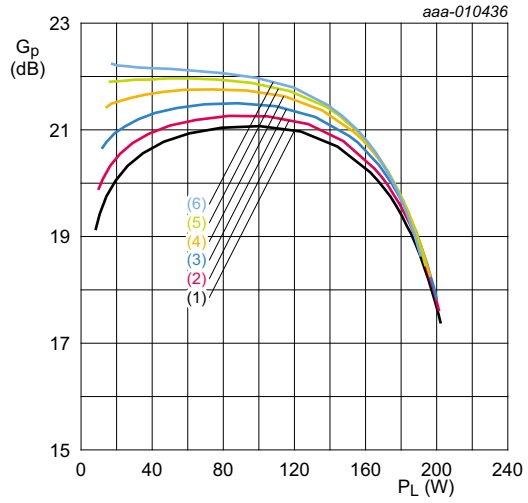
## 7.3 Graphical data

### 7.3.1 1-Tone pulsed




$V_{DS}$ = 28 V; $I_{Dq}$ = 200 mA; f = 860 MHz.

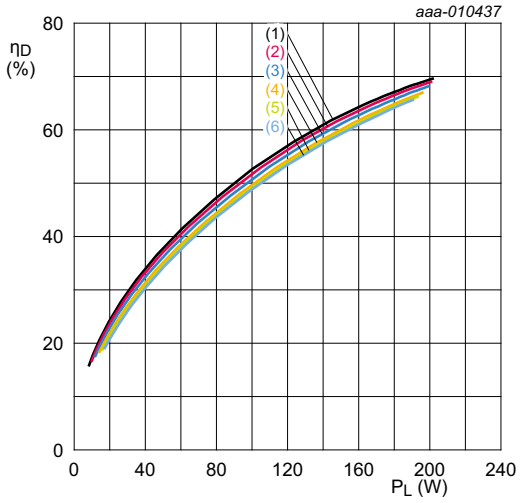
**Fig 2. Power gain and drain efficiency as function of output power; typical values**




$V_{DS}$ = 28 V; f = 860 MHz.

(1) $I_{Dq}$ = 50 mA
(2) $I_{Dq}$ = 100 mA
(3) $I_{Dq}$ = 200 mA
(4) $I_{Dq}$ = 400 mA
(5) $I_{Dq}$ = 600 mA
(6) $I_{Dq}$ = 800 mA

**Fig 3. Power gain as a function of output power; typical values**

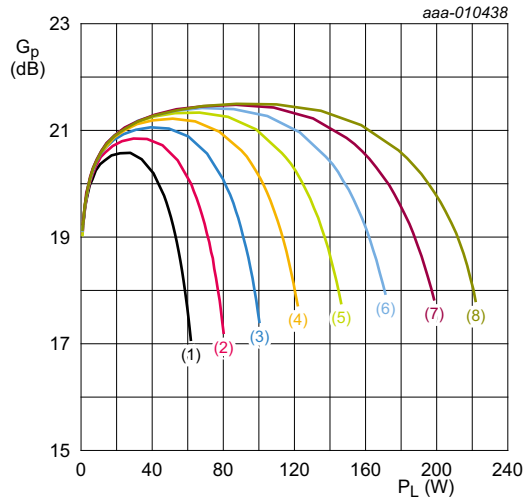



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(6) $I_{Dq}$ = 800 mA

**Fig 4. Drain efficiency as a function of output power; typical values**

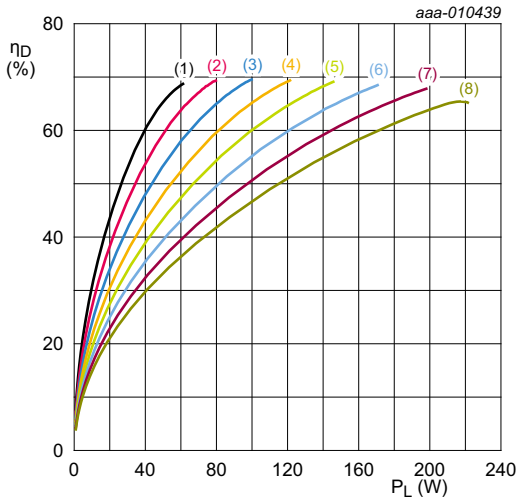

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$I_{Dq}$ = 200 mA; f = 860 MHz.

(1) $V_{DS}$ = 16 V
(2) $V_{DS}$ = 18 V
(3) $V_{DS}$ = 20 V
(4) $V_{DS}$ = 22 V
(5) $V_{DS}$ = 24 V
(6) $V_{DS}$ = 26 V
(7) $V_{DS}$ = 28 V
(8) $V_{DS}$ = 30 V

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




$I_{Dq}$ = 200 mA; f = 860 MHz.

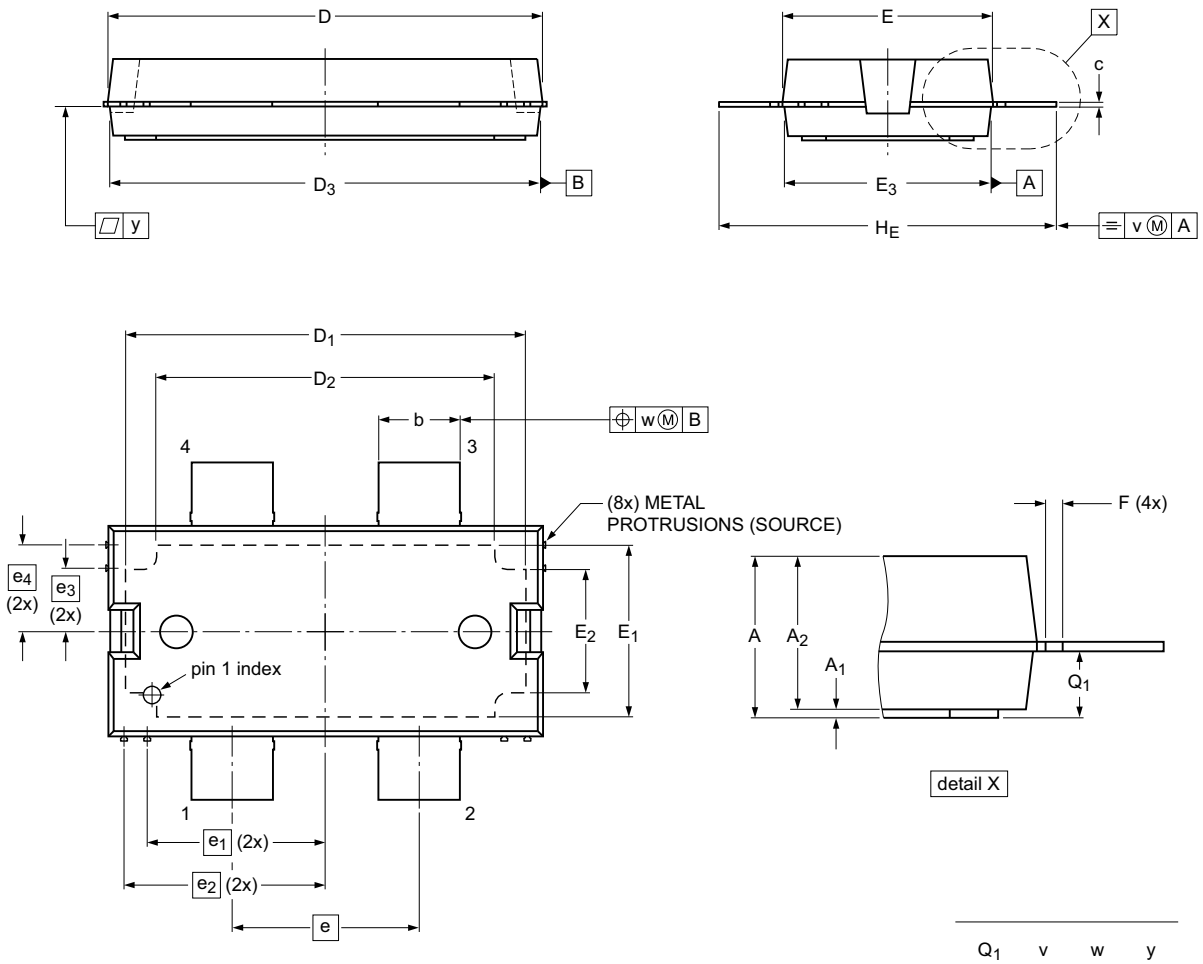
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(3) $V_{DS}$ = 20 V
(4) $V_{DS}$ = 22 V
(5) $V_{DS}$ = 24 V
(6) $V_{DS}$ = 26 V
(7) $V_{DS}$ = 28 V
(8) $V_{DS}$ = 30 V

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


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# 8. Package outline

**HSOP4F: plastic, heatsink small outline package; 4 leads(flat)** **SOT1223-2**




| $Q_1$ | v | w | y |
|---|---|---|---|
| 1.62 | | | 0.1 |
| 1.57 | 0.25 | 0.25 | |
| 1.52 | | | |

Dimensions (mm are the original dimensions)

| Unit | | A | $A_1$ | $A_2$ | b | c | $D^{(1)}$ | $D_1$ | $D_2$ | $D_3$ | $E^{(1)}$ | $E_1$ | $E_2$ | $E_3$ | e | $e_1$ | $e_2$ | $e_3$ | $e_4$ | F | $H_E$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | max | 3.9 | 0.2 | 3.65 | 3.90 | 0.27 | 20.62 | 19.00 | 16.05 | 20.44 | 10.01 | 8.18 | 5.89 | 9.83 | | | | | | | 16.16 |
| mm | nom | | 0.1 | 3.60 | 3.85 | 0.22 | 20.57 | 18.95 | 16.00 | 20.39 | 9.96 | 8.13 | 5.84 | 9.78 | 8.85 | 8.45 | 9.55 | 2.97 | 4.07 | 0.4 | 15.96 |
| | min | | 0 | 3.55 | 3.80 | 0.17 | 20.52 | 18.90 | 15.95 | 20.34 | 9.91 | 8.08 | 5.79 | 9.73 | | | | | | | 15.76 |

Note
1. Package body dimensions “D and “E do not include mold and metal protrusions. Allowable protrusion is 0.25 mm per side.
2. Lead width dimension “b does not include dambar protrusions. Allowable dambar protrusion is 0.25 mm in total per lead.

*sot1223-2_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT1223-2 | | | | | | ~~15-01-12~~ 15-06-04 |

**Fig 7. Package outline SOT1223-2 (HSOP4F)**


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# 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.

**Table 10. ESD sensitivity**

| ESD model | Class |
|---|---|
| Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002 | C2A [1] |
| Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001 | 2 [2] |

[1] CDM classification C2A is granted to any part that passes after exposure to an ESD pulse of 500 V.

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 V.

# 10. Abbreviations

**Table 11. Abbreviations**

| Acronym | Description |
|---|---|
| CW | Continuous Wave |
| ESD | ElectroStatic Discharge |
| HF | High Frequency |
| LDMOS | Laterally Diffused Metal-Oxide Semiconductor |
| MTF | Median Time to Failure |
| RoHS | Restriction of Hazardous Substances |
| SMD | Surface Mounted Device |
| VSWR | Voltage Standing Wave Ratio |

# 11. Revision history

**Table 12. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BLP7G10S-160P v.1 | 20180830 | Product data sheet | - | - |


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[2] The term 'short data sheet' is explained in section "Definitions".

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**Date of release: 30 August 2018**
**Document identifier: BLP7G10S-160P**

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