## DATA SHEET



## BLF248

VHF push-pull power MOS transistor

Product specification

## FEATURES

- High power gain
- Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.


## DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor, designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT262 A1 balanced flange package, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT262 A1

| PIN | DESCRIPTION |
| :---: | :--- |
| 1 | drain 1 |
| 2 | drain 2 |
| 3 | gate 1 |
| 4 | gate 2 |
| 5 | source |

## PIN CONFIGURATION



## CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A, and SNW-FQ-302B.

| WARNING |
| :--- |
| Product and environmental safety - toxic materials |
| This product contains beryllium oxide. The product is entirely safe provided <br> that the BeO discs are not damaged. All persons who handle, use or dispose <br> of this product should be aware of its nature and of the necessary safety <br> precautions. After use, dispose of as chemical or special waste according to <br> the regulations applying at the location of the user. It must never be thrown <br> out with the general or domestic waste. |

## QUICK REFERENCE DATA

RF performance at $\mathrm{T}_{\mathrm{h}}=25^{\circ} \mathrm{C}$ in a push-pull common source test circuit.

| MODE OF OPERATION | $\mathbf{f}$ <br> $(\mathbf{M H z})$ | $\mathbf{V}_{\mathbf{D S}}$ <br> $\mathbf{( V )}$ | $\mathbf{P}_{\mathbf{L}}$ <br> $\mathbf{( W )}$ | $\mathbf{G}_{\mathbf{p}}$ <br> $(\mathbf{d B})$ | $\eta_{\mathbf{D}}$ <br> $(\%)$ |
| :--- | :---: | :---: | :---: | :---: | :---: |
| class-AB | 225 | 28 | 300 | $>10$ | $>55$ |
|  | 175 | 28 | 300 | typ. 13 | typ. 67 |

## VHF push-pull power MOS transistor

BLF248

## LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 60134).
Per transistor section unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\mathrm{V}_{\mathrm{DS}}$ | drain-source voltage |  | - | 65 | V |
| $\mathrm{~V}_{\mathrm{GS}}$ | gate-source voltage |  | - | $\pm 20$ | V |
| $\mathrm{I}_{\mathrm{D}}$ | drain current (DC) |  | - | 25 | A |
| $\mathrm{P}_{\text {tot }}$ | total power dissipation | $\mathrm{T}_{\text {mb }} \leq 25^{\circ} \mathrm{C}$ total device; <br> both sections equally loaded | - | 500 | W |
| $\mathrm{~T}_{\text {stg }}$ | storage temperature |  | -65 | 150 | ${ }^{\circ} \mathrm{C}$ |

THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
| :--- | :--- | :--- | :---: | :---: |
| $R_{\text {th j-mb }}$ | thermal resistance from junction to <br> mounting base | total device; both sections <br> equally loaded. | 0.35 | K/W |
| $R_{\text {th mb-h }}$ | thermal resistance from mounting base to <br> heatsink | total device; both sections <br> equally loaded. | 0.15 | K/W |


(1) Current is this area may be limited by $R_{D S o n}$.
(2) $\mathrm{T}_{\mathrm{mb}}=25^{\circ} \mathrm{C}$.

Total device; both sections equally loaded.
Fig. 2 DC SOAR.

(1) Continuous operation
(2) Short-time operation during mismatch.

Total device; both sections equally loaded.
Fig. 3 Power derating curves.

## CHARACTERISTICS

$\mathrm{T}_{\mathrm{j}}=25^{\circ} \mathrm{C}$ unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Per section |  |  |  |  |  |  |
| $\mathrm{V}_{\text {(BR) } \mathrm{DSS}}$ | drain-source breakdown voltage | $\mathrm{V}_{\mathrm{GS}}=0 ; \mathrm{I}_{\mathrm{D}}=100 \mathrm{~mA}$ | 65 | - | - | V |
| $\mathrm{I}_{\text {DSS }}$ | drain-source leakage current | $\mathrm{V}_{\mathrm{GS}}=0 ; \mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V}$ | - | - | 5 | mA |
| $\mathrm{I}_{\text {GSS }}$ | gate-source leakage current | $\mathrm{V}_{\mathrm{GS}}= \pm 20 \mathrm{~V} ; \mathrm{V}_{\mathrm{DS}}=0$ | - | - | 1 | $\mu \mathrm{A}$ |
| $\mathrm{V}_{\text {GSth }}$ | gate-source threshold voltage | $\mathrm{I}_{\mathrm{D}}=100 \mathrm{~mA} ; \mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}$ | 2 | - | 4.5 | V |
| $\Delta \mathrm{V}_{\mathrm{GS}}$ | gate-source voltage difference of both transistor sections | $\mathrm{I}_{\mathrm{D}}=100 \mathrm{~mA} ; \mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}$ | - | - | 100 | mV |
| $\mathrm{g}_{\mathrm{fs}}$ | forward transconductance | $\mathrm{I}_{\mathrm{D}}=8 \mathrm{~A} ; \mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}$ | 5 | 7.5 | - | S |
| $\mathrm{g}_{\mathrm{fs} 1} / \mathrm{g}_{\mathrm{fs} 2}$ | forward transconductance ratio of both transistor sections | $\mathrm{I}_{\mathrm{D}}=8 \mathrm{~A} ; \mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}$ | 0.9 | - | 1.1 |  |
| $\mathrm{R}_{\text {DSon }}$ | drain-source on-state resistance | $\mathrm{I}_{\mathrm{D}}=8 \mathrm{~A} ; \mathrm{V}_{\mathrm{GS}}=10 \mathrm{~V}$ | - | 0.1 | 0.15 | $\Omega$ |
| $\mathrm{I}_{\text {DSX }}$ | on-state drain current | $\mathrm{V}_{\mathrm{GS}}=10 \mathrm{~V} ; \mathrm{V}_{\mathrm{DS}}=10 \mathrm{~V}$ | - | 37 | - | A |
| $\mathrm{C}_{\text {is }}$ | input capacitance | $\mathrm{V}_{\mathrm{GS}}=0 ; \mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V} ; \mathrm{f}=1 \mathrm{MHz}$ | - | 500 | - | pF |
| $\mathrm{C}_{\text {os }}$ | output capacitance | $\mathrm{V}_{\mathrm{GS}}=0 ; \mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V} ; \mathrm{f}=1 \mathrm{MHz}$ | - | 360 | - | pF |
| $\mathrm{C}_{\text {rs }}$ | feedback capacitance | $\mathrm{V}_{\mathrm{GS}}=0 ; \mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V} ; \mathrm{f}=1 \mathrm{MHz}$ | - | 46 | - | pF |

$\mathrm{V}_{\mathrm{GS}}$ group indicator

| GROUP | LIMITS <br> (V) |  | GROUP | LIMITS <br> (V) |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | MIN. | MAX. |  | MIN. | MAX. |
| A | 2.0 | 2.1 | O | 3.3 | 3.4 |
| B | 2.1 | 2.2 | P | 3.4 | 3.5 |
| C | 2.2 | 2.3 | Q | 3.5 | 3.6 |
| D | 2.3 | 2.4 | R | 3.6 | 3.7 |
| E | 2.4 | 2.5 | S | 3.7 | 3.8 |
| F | 2.5 | 2.6 | T | 3.8 | 3.9 |
| G | 2.6 | 2.7 | U | 3.9 | 4.0 |
| H | 2.7 | 2.8 | V | 4.0 | 4.1 |
| J | 2.8 | 2.9 | W | 4.1 | 4.2 |
| K | 2.9 | 3.0 | X | 4.2 | 4.3 |
| L | 3.0 | 3.1 | Y | 4.3 | 4.4 |
| M | 3.1 | 3.2 | Z | 4.4 | 4.5 |
| N | 3.2 | 3.3 |  |  |  |


$V_{D S}=10 \mathrm{~V}$.

Fig. 4 Temperature coefficient of gate-source voltage as a function of drain current; typical values per section.

$\mathrm{I}_{\mathrm{D}}=8 \mathrm{~A} ; \mathrm{V}_{\mathrm{GS}}=10 \mathrm{~V}$.

Fig. 6 Drain-source on-state resistance as a function of junction temperature; typical values per section.

$V_{D S}=10 \mathrm{~V} ; \mathrm{T}_{\mathrm{j}}=25^{\circ} \mathrm{C}$.

Fig. 5 Drain current as a function of gate-source voltage; typical values per section.

$V_{G S}=0 ; f=1 M H z$.

Fig. 7 Input and output capacitance as functions of drain-source voltage; typical values per section.

$V_{G S}=0 ; f=1 \mathrm{MHz}$.

Fig. 8 Feedback capacitance as a function of drain-source voltage; typical values per section.

## APPLICATION INFORMATION FOR CLASS-AB OPERATION

$\mathrm{T}_{\mathrm{h}}=25^{\circ} \mathrm{C} ; \mathrm{R}_{\mathrm{th} \text { mb-h }}=0.15 \mathrm{~K} / \mathrm{W}$, unless otherwise specified.
RF performance in a linear amplifier in a common source class-AB circuit.
$R_{G S}=536 \Omega$ per section; optimum load impedance per section $=0.79-j 0.11 \Omega$.

| MODE OF OPERATION | $\begin{gathered} f \\ (\mathrm{MHz}) \end{gathered}$ | $V_{D S}$ <br> (V) | $\begin{gathered} \mathbf{P}_{\mathrm{L}} \\ (\mathrm{~W}) \end{gathered}$ | $\begin{gathered} \mathrm{G}_{\mathrm{p}} \\ (\mathrm{~dB}) \end{gathered}$ | $\begin{gathered} \eta_{D} \\ (\%) \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| class-AB | 225 | 28 | 300 | $\begin{gathered} >10 \\ \text { typ. } 11.5 \end{gathered}$ | $\begin{gathered} >55 \\ \text { typ. } 65 \end{gathered}$ |
|  | 175 | 28 | 300 | typ. 13 | typ. 67 |

## Ruggedness in class-AB operation

The BLF248 is capable of withstanding a load mismatch corresponding to VSWR = 50 through all phases under the following conditions:
$V_{D S}=28 \mathrm{~V} ; \mathrm{f}=225 \mathrm{MHz}$ at rated output power.


Class-AB operation; $\mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V}$; $\mathrm{I}_{\mathrm{DQ}}=2 \times 250 \mathrm{~mA}$;
$\mathrm{R}_{\mathrm{GS}}=536 \Omega$ (per section); $\mathrm{Z}_{\mathrm{L}}=0.79-\mathrm{j} 0.11 \Omega$ (per
section); $f=225 \mathrm{MHz}$.
Fig. 9 Power gain and efficiency as functions of load power; typical values.


Class-AB operation; $\mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V}$; $\mathrm{I}_{\mathrm{DQ}}=2 \times 250 \mathrm{~mA}$;
$\mathrm{R}_{\mathrm{GS}}=536 \Omega$ (per section); $\mathrm{Z}_{\mathrm{L}}=0.79-\mathrm{j} 0.11 \Omega$ (per section); $\mathfrak{f}=225 \mathrm{MHz}$.

Fig. 10 Load power as a function of input power; typical values.

Fig． 11 Test circuit for class－AB operation．
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## VHF push-pull power MOS transistor

List of components class-AB test circuit; (see Figs 11 and 12)

| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
| :---: | :---: | :---: | :---: | :---: |
| C1, C2 | multilayer ceramic chip capacitor; note 1 | $\begin{aligned} & 2 \times 56 \mathrm{pF} \\ & +18 \mathrm{pF} \text { in parallel, } \\ & 500 \mathrm{~V} \end{aligned}$ |  |  |
| C3 | film dielectric trimmer | 2 to 9 pF |  | 222280909005 |
| C4 | multilayer ceramic chip capacitor; note 1 | $47 \mathrm{pF}, 500 \mathrm{~V}$ |  |  |
| C5 | film dielectric trimmer | 5 to 60 pF |  | 222280908003 |
| $\begin{aligned} & \text { C6, C7, C9, } \\ & \text { C10, C12, C15, } \\ & \text { C31, C34 } \end{aligned}$ | multilayer ceramic chip capacitor; note 1 | $1 \mathrm{nF}, 500 \mathrm{~V}$ |  |  |
| $\begin{aligned} & \text { C8, C11, C16, } \\ & \text { C21, C32 } \end{aligned}$ | multilayer ceramic chip capacitor | $100 \mathrm{nF}, 50 \mathrm{~V}$ |  | 222285247104 |
| $\begin{aligned} & \text { C13, C14, C18, } \\ & \text { C19 } \end{aligned}$ | multilayer ceramic chip capacitor; note 1 | 510 pF, 500 V |  |  |
| C17, C20, C33 | electrolytic capacitor | $10 \mu \mathrm{~F}, 63 \mathrm{~V}$ |  |  |
| C22 | multilayer ceramic chip capacitor; note 1 | $82 \mathrm{pF}, 500 \mathrm{~V}$ |  |  |
| C23 | multilayer ceramic chip capacitor; note 1 | $10 \mathrm{pF}+30 \mathrm{pF}$ in parallel, 500 V |  |  |
| C24, C28 | film dielectric trimmer | 2 to 18 pF |  | 222280909006 |
| C25, C26 | multilayer ceramic chip capacitor; note 1 | $\begin{array}{\|l\|} \hline 39 \mathrm{pF}+47 \mathrm{pF} \\ \text { in parallel, } 500 \mathrm{~V} \\ \hline \end{array}$ |  |  |
| C27 | multilayer ceramic chip capacitor; note 1 | $18 \mathrm{pF}, 500 \mathrm{~V}$ |  |  |
| C29, C30 | multilayer ceramic chip capacitor; note 1 | $\begin{array}{\|l\|} \hline 3 \times 100 \mathrm{pF} \\ \text { in parallel, } 500 \mathrm{~V} \end{array}$ |  |  |
| L1, L3, L22, L24 | stripline; note 2 | $50 \Omega$ | $4.8 \times 80 \mathrm{~mm}$ |  |
| L2, L23 | semi-rigid cable; note 3 | $50 \Omega$ | ext. dia. 3.6 mm ext. conductor length 80 mm |  |
| L4, L5 | stripline; note 2 | $43 \Omega$ | $6 \times 32.5 \mathrm{~mm}$ |  |
| L6, L7, L10, L11 | stripline; note 2 | $43 \Omega$ | $6 \times 10.5 \mathrm{~mm}$ |  |
| L8, L9 | stripline; note 2 | $43 \Omega$ | $6 \times 3 \mathrm{~mm}$ |  |
| L12, L15 | grade 3B Ferroxcube wide-band HF choke | 2 in parallel |  | 431202036642 |
| L13, L14 | 2 turns enamelled 1.6 mm copper wire | 25 nH | int. dia. 5 mm leads $2 \times 7 \mathrm{~mm}$ space 2.5 mm |  |
| L16, L17 | stripline; notes 2 and 4 | $43 \Omega$ | $6 \times 3 \mathrm{~mm}$ |  |
| L18, L19 | stripline; notes 2 and 4 | $43 \Omega$ | $6 \times 35 \mathrm{~mm}$ |  |
| L20, L21 | stripline; notes 2 and 4 | $43 \Omega$ | $6 \times 9 \mathrm{~mm}$ |  |
| R1, R6 | 10 turns potentiometer | $50 \mathrm{k} \Omega$ |  |  |
| R2, R5 | 0.4 W metal film resistor | $1 \mathrm{k} \Omega$ |  |  |


| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
| :--- | :--- | :--- | :--- | :--- |
| R3, R4 | 0.4 W metal film resistor | $536 \Omega$ |  |  |
| R7, R8 | 1 W metal film resistor | $10 \Omega \pm 5 \%$ |  |  |
| R9 | 1 W metal film resistor | $3.16 \mathrm{k} \Omega$ |  |  |
| IC1 | 78 L05 voltage regulator |  |  |  |

## Notes

1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. L1, L3 to L11, L16 to L22 and L24 are micro-striplines on a double copper-clad printed-circuit board, with glass microfibre PTFE dielectric ( $\varepsilon_{r}=2.2$ ), thickness $1 / 16$ inch, thickness of copper sheet $2 \times 35 \mu \mathrm{~m}$.
3. L2 and L23 are soldered on striplines L1 and L24 respectively.
4. A copper strap, thickness 0.8 mm , is soldered on striplines L16 to L21.


## Dimensions in mm.

The circuit and components are situated on one side of the printed circuit board, the other side being fully metallized, to serve as a ground plane. Earth connections are made by means of copper straps and hollow rivets.

Fig. 12 Component layout for 225 MHz class-AB test circuit.


Class-AB operation; $\mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V}$; $\mathrm{I}_{\mathrm{D}}=2 \times 250 \mathrm{~mA}$;
$\mathrm{R}_{\mathrm{GS}}=536 \Omega$ (per section);
$\mathrm{P}_{\mathrm{L}}=300 \mathrm{~W}$ (total device); $\mathrm{T}_{\mathrm{h}}=25^{\circ} \mathrm{C}$.
Fig. 13 Input impedance as a function of frequency (series components); typical values per section.


Class-AB operation; $\mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V} ; \mathrm{I}_{\mathrm{D}}=2 \times 250 \mathrm{~mA}$;
$\mathrm{R}_{\mathrm{GS}}=536 \Omega$ (per section);
$\mathrm{P}_{\mathrm{L}}=300 \mathrm{~W}$ (total device); $\mathrm{T}_{\mathrm{h}}=25^{\circ} \mathrm{C}$.
Fig. 15 Power gain as a function of frequency; typical values per section.


Class-AB operation; $\mathrm{V}_{\mathrm{DS}}=28 \mathrm{~V}$; $\mathrm{I}_{\mathrm{D}}=2 \times 250 \mathrm{~mA}$;
$\mathrm{R}_{\mathrm{GS}}=536 \Omega$ (per section);
$\mathrm{P}_{\mathrm{L}}=300 \mathrm{~W}$ (total device); $\mathrm{T}_{\mathrm{h}}=25^{\circ} \mathrm{C}$.
Fig. 14 Load impedance as a function of frequency (series components); typical values per section. section.

## VHF push-pull power MOS transistor

## BLF248 scattering parameters

$V_{D S}=28 \mathrm{~V} ; \mathrm{I}_{\mathrm{D}}=250 \mathrm{~mA}$; note 1

| $\mathbf{f}(\mathbf{M H z})$ | $\mathbf{s}_{\mathbf{1 1}}$ |  | $\mathbf{s}_{\mathbf{2 1}}$ |  | $\mathbf{s}_{\mathbf{1 2}}$ |  | $\mathbf{s}_{\mathbf{2 2}}$ |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\left\|\mathbf{s}_{\mathbf{1 1}}\right\|$ | $\angle \Phi$ | $\left\|\mathbf{s}_{\mathbf{2 1}}\right\|$ | $\angle \Phi$ | $\left\|\mathbf{s}_{\mathbf{1 2}}\right\|$ | $\angle \Phi$ | $\left\|\mathbf{s}_{\mathbf{2 2}}\right\|$ | $\angle \Phi$ |
| 5 | 0.85 | -158.7 | 22.19 | 97.0 | 0.01 | -1.4 | 0.90 | 168.9 |
| 10 | 0.85 | -168.6 | 11.27 | 88.5 | 0.01 | 20.7 | 0.85 | 174.2 |
| 20 | 0.85 | -173.2 | 5.51 | 79.0 | 0.01 | 18.2 | 0.83 | 178.2 |
| 30 | 0.86 | -174.1 | 3.57 | 72.0 | 0.02 | 8.2 | 0.83 | -179.8 |
| 40 | 0.87 | -174.3 | 2.56 | 65.9 | 0.02 | -0.2 | 0.83 | -178.0 |
| 50 | 0.88 | -174.4 | 1.96 | 60.6 | 0.02 | -7.2 | 0.85 | -176.6 |
| 60 | 0.89 | -174.6 | 1.55 | 55.7 | 0.01 | -13.1 | 0.86 | -175.8 |
| 70 | 0.90 | -174.8 | 1.26 | 51.3 | 0.01 | -17.8 | 0.87 | -175.3 |
| 80 | 0.91 | -175.1 | 1.05 | 47.5 | 0.01 | -21.6 | 0.89 | -175.0 |
| 90 | 0.92 | -175.5 | 0.88 | 44.0 | 0.01 | -24.6 | 0.90 | -174.9 |
| 100 | 0.93 | -175.8 | 0.76 | 40.6 | 0.01 | -27.0 | 0.91 | -175.0 |
| 125 | 0.95 | -176.7 | 0.53 | 33.6 | 0.01 | -30.2 | 0.93 | -175.6 |
| 150 | 0.96 | -177.6 | 0.38 | 28.9 | 0.01 | -28.2 | 0.94 | -175.6 |
| 175 | 0.97 | -178.4 | 0.30 | 25.5 | 0.00 | -21.2 | 0.96 | -176.0 |
| 200 | 0.97 | -179.2 | 0.23 | 22.3 | 0.00 | -5.3 | 0.97 | -176.7 |
| 250 | 0.98 | 179.4 | 0.16 | 18.6 | 0.00 | 47.5 | 0.98 | -177.6 |
| 300 | 0.98 | 178.2 | 0.11 | 17.2 | 0.01 | 71.9 | 0.98 | -178.5 |
| 350 | 0.98 | 177.1 | 0.08 | 16.7 | 0.01 | 78.0 | 0.99 | -179.1 |
| 400 | 0.99 | 176.2 | 0.07 | 18.9 | 0.01 | 84.9 | 0.99 | -179.9 |
| 450 | 0.99 | 175.2 | 0.05 | 21.7 | 0.01 | 88.1 | 0.99 | 179.6 |
| 500 | 0.99 | 174.2 | 0.05 | 26.7 | 0.01 | 88.6 | 0.99 | 179.0 |
| 600 | 0.99 | 172.3 | 0.04 | 38.3 | 0.02 | 89.4 | 1.00 | 177.9 |
| 700 | 0.99 | 170.4 | 0.03 | 50.8 | 0.02 | 90.0 | 1.00 | 176.9 |
| 800 | 0.99 | 168.6 | 0.03 | 63.7 | 0.03 | 91.0 | 1.00 | 176.0 |
| 900 | 0.99 | 166.6 | 0.04 | 71.0 | 0.03 | 91.6 | 1.00 | 175.0 |
| 1000 | 0.99 | 164.7 | 0.04 | 77.6 | 0.04 | 92.3 | 1.00 | 174.1 |

## Note

1. For more extensive s-parameters see internet:
http://www.semiconductors.philips.com/markets/communications/wirelesscommunication/broadcast

## PACKAGE OUTLINE



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

| UNIT | A | b | c | D | $\mathrm{D}_{1}$ | e | E | $\mathrm{E}_{1}$ | F | H | $\mathrm{H}_{1}$ | p | Q | q | $\mathrm{U}_{1}$ | $\mathrm{U}_{2}$ | $\mathrm{w}_{1}$ | $\mathrm{w}_{2}$ | $\mathrm{w}_{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| mm | $\begin{aligned} & 5.77 \\ & 5.00 \end{aligned}$ | $\begin{aligned} & 5.85 \\ & 5.58 \end{aligned}$ | $\begin{aligned} & 0.16 \\ & 0.10 \end{aligned}$ | $\begin{aligned} & 22.17 \\ & 21.46 \end{aligned}$ | $\begin{aligned} & 21.98 \\ & 21.71 \end{aligned}$ | 11.05 | $\begin{aligned} & 10.27 \\ & 10.05 \end{aligned}$ | $\begin{aligned} & 10.29 \\ & 10.03 \end{aligned}$ | $\begin{aligned} & 1.78 \\ & 1.52 \end{aligned}$ | $\begin{aligned} & 21.08 \\ & 19.56 \end{aligned}$ | $\begin{aligned} & 17.02 \\ & 16.51 \end{aligned}$ | $\begin{aligned} & 3.28 \\ & 3.02 \end{aligned}$ | $\begin{aligned} & 2.85 \\ & 2.59 \end{aligned}$ | 27.94 | $\begin{aligned} & 34.17 \\ & 33.90 \end{aligned}$ | $\begin{aligned} & 9.91 \\ & 9.65 \end{aligned}$ | 0.25 | 0.51 | 0.25 |
| inches | $\begin{aligned} & 0.227 \\ & 0.197 \end{aligned}$ | $\begin{aligned} & 0.230 \\ & 0.220 \end{aligned}$ | $\begin{aligned} & 0.006 \\ & 0.004 \end{aligned}$ | $\begin{aligned} & 0.873 \\ & 0.845 \end{aligned}$ | $\begin{aligned} & 0.865 \\ & 0.855 \end{aligned}$ | 0.435 | $\begin{aligned} & 0.404 \\ & 0.396 \end{aligned}$ | $\begin{aligned} & 0.405 \\ & 0.396 \end{aligned}$ | $\begin{aligned} & 0.070 \\ & 0.060 \end{aligned}$ | $\begin{aligned} & 0.830 \\ & 0.770 \end{aligned}$ | $\begin{aligned} & 0.670 \\ & 0.650 \end{aligned}$ | $\begin{aligned} & 0.129 \\ & 0.119 \end{aligned}$ | $\begin{aligned} & 0.112 \\ & 0.102 \end{aligned}$ | 1.100 | $\begin{aligned} & 1.345 \\ & 1.335 \end{aligned}$ | $\begin{aligned} & 0.390 \\ & 0.380 \end{aligned}$ | 0.010 | 0.020 | 0.010 |


| OUTLINE <br> VERSION | REFERENCES |  |  |  | EUROPEAN <br> PROJECTION | ISSUE DATE |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
|  | IEC | JEDEC | EIAJ |  |  |  |
| SOT262A1 |  |  |  |  | $99-03-29$ |  |

## DATA SHEET STATUS

| LEVEL | DATA SHEET STATUS ${ }^{(1)}$ | PRODUCT STATUS ${ }^{(2)(3)}$ | DEFINITION |
| :---: | :---: | :---: | :---: |
| I | Objective data | Development | This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice. |
| II | Preliminary data | Qualification | This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product. |
| III | Product data | Production | This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). |

## Notes

1. Please consult the most recently issued data sheet before initiating or completing a design.
2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## DEFINITIONS

Short-form specification - The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition - Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

Application information - Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

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