# BLF642

## Broadband power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON
Product data sheet

# 1. Product profile

## 1.1 General description

A 35 W LDMOS RF power transistor for broadcast transmitter and industrial applications. The transistor is suitable for the frequency range HF to 1400 MHz. The excellent ruggedness and broadband performance of this device makes it ideal for digital applications.

**Table 1. Typical performance**

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

| Mode of operation | f (MHz) | $V_{DS}$ (V) | $P_L$ (W) | $G_p$ (dB) | $\eta_D$ (%) | IMD (dBc) |
|---|---|---|---|---|---|---|
| CW, class-AB | 1300 | 32 | 35 | 19 | 63 | - |
| 2-tone, class-AB | 1300 | 32 | 17.5 | 19 | 48 | −28 |

## 1.2 Features and benefits

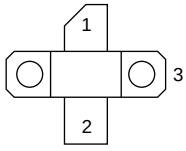
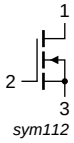
- CW performance at 1300 MHz, a drain-source voltage $V_{DS}$ of 32 V and a quiescent drain current $I_{Dq}$ = 0.2 A :
  - Average output power = 35 W
  - Power gain = 19 dB
  - Drain efficiency = 63 %
- 2-tone performance at 1300 MHz, a drain-source voltage $V_{DS}$ of 32 V and a quiescent drain current $I_{Dq}$ = 0.2 A :
  - Average output power = 17.5 W
  - Power gain = 19 dB
  - Drain efficiency = 48 %
  - Intermodulation distortion = −28 dBc
- Integrated ESD protection
- Excellent ruggedness
- High power gain
- High efficiency
- Excellent reliability
- Easy power control
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

### 1.3 Applications

- Communication transmitter applications in the HF to 1400 MHz frequency range
- Industrial applications in the HF to 1400 MHz frequency range

## 2. Pinning information

**Table 2. Pinning**

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



sym112

[1] Connected to flange

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BLF642 | - | flanged LDMOST ceramic package; 2 mounting holes; 2 leads | SOT467C |

## 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 | +11 | V |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $T_j$ | junction temperature | | - | 200 | °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; $P_L$ = 35 W | [1] | 1.6 | K/W |

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


All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

# 6. Characteristics

**Table 6. Characteristics per section**
*$T_j$ = 25 °C; unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS}$ = 0 V; $I_D$ = 0.5 mA | 65 | - | - | V |
| $V_{GS(th)}$ | gate-source threshold voltage | $V_{DS}$ = 32 V; $I_D$ = 50 mA | 1.4 | 1.9 | 2.4 | V |
| $V_{GSq}$ | gate-source quiescent voltage | $V_{DS}$ = 32 V; $I_{Dq}$ = 250 mA | 1.5 | 2.0 | 2.5 | V |
| $I_{DSS}$ | drain leakage current | $V_{GS}$ = 0 V; $V_{DS}$ = 32 V | - | - | 1.4 | μA |
| $I_{DSX}$ | drain cut-off current | $V_{GS}$ = $V_{GS(th)}$ + 3.75 V; $V_{DS}$ = 10 V | 8.0 | 9.0 | - | A |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = ±10 V; $V_{DS}$ = 0 V | - | - | 50 | nA |
| $g_{fs}$ | forward transconductance | $V_{DS}$ = 10 V; $I_D$ = 2.5 A | - | 3.3 | - | S |
| $R_{DS(on)}$ | drain-source on-state resistance | $V_{GS}$ = $V_{GS(th)}$ + 3.75 V; $I_D$ = 1.75 A | - | 300 | - | mΩ |
| $C_{iss}$ | input capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 32 V; f = 1 MHz | - | 39 | - | pF |
| $C_{oss}$ | output capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 32 V; f = 1 MHz | - | 15 | - | pF |
| $C_{rs}$ | feedback capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 32 V; f = 1 MHz | - | 0.84 | - | pF |

# 7. Application information

**Table 7. RF performance in a common-source class-AB circuit**
*$T_h$ = 25 °C; $I_{Dq}$ = 0.2 A.*

| Mode of operation | f (MHz) | $V_{DS}$ (V) | $P_L$ (W) | $G_p$ (dB) | $\eta_D$ (%) |
|---|---|---|---|---|---|
| CW, class-AB | 1300 | 32 | 35 | > 18 | > 59 |

## 7.1 Ruggedness in class-AB operation

The BLF642 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS}$ = 32 V; f = 1300 MHz at rated load power.

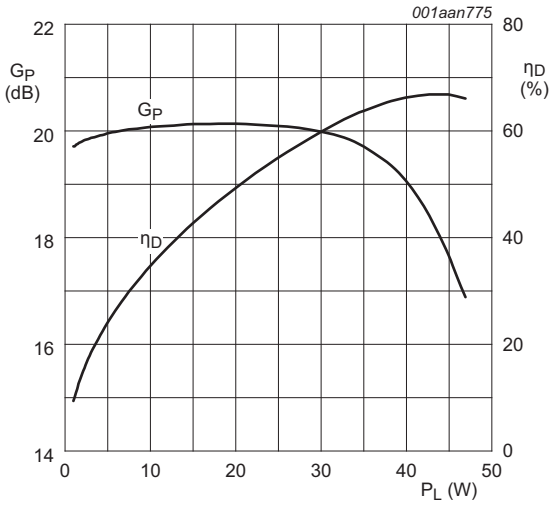

All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

# 8. Test information

## 8.1 RF performance

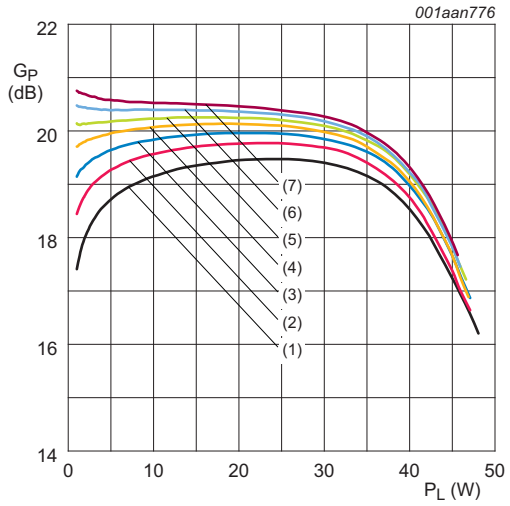
The following figures are measured in a class-AB production test circuit.

### 8.1.1 1-Tone CW




$V_{DS}$ = 32 V; $I_{Dq}$ = 200 mA; f = 1300 MHz.

**Fig 1. Power gain and drain efficiency as function of load power; typical values**



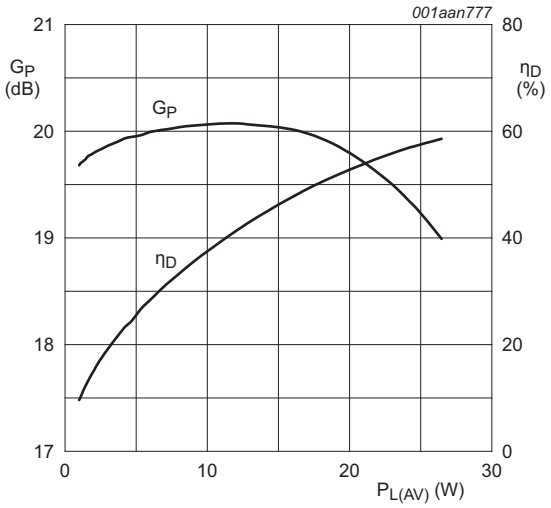

$V_{DS}$ = 32 V; f = 1300 MHz.

(1) $I_{Dq}$ = 50 mA
(2) $I_{Dq}$ = 100 mA
(3) $I_{Dq}$ = 150 mA
(4) $I_{Dq}$ = 200 mA
(5) $I_{Dq}$ = 250 mA
(6) $I_{Dq}$ = 300 mA
(7) $I_{Dq}$ = 350 mA

**Fig 2. Power gain as a function of load power; typical values**

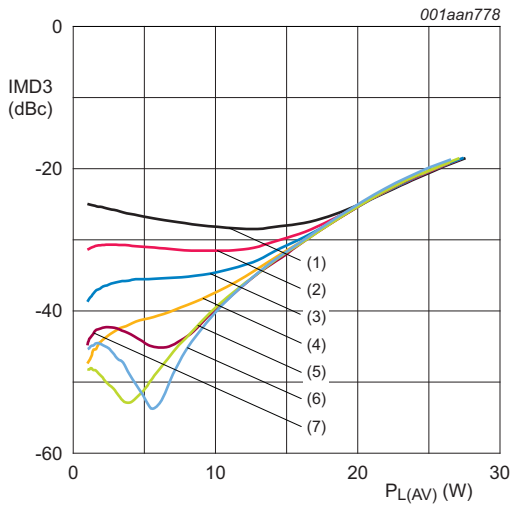

All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

### 8.1.2 2-Tone CW




$V_{DS}$ = 32 V; $I_{Dq}$ = 200 mA; f = 1300 MHz; carrier spacing = 100 kHz.

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

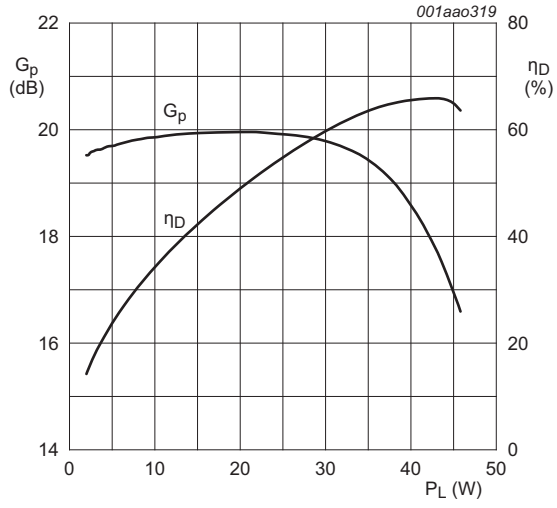



$V_{DS}$ = 32 V; f = 1300 MHz; carrier spacing = 100 kHz.

(1) $I_{Dq}$ = 50 mA
(2) $I_{Dq}$ = 100 mA
(3) $I_{Dq}$ = 150 mA
(4) $I_{Dq}$ = 200 mA
(5) $I_{Dq}$ = 250 mA
(6) $I_{Dq}$ = 300 mA
(7) $I_{Dq}$ = 350 mA

**Fig 4. Third order intermodulation distortion as a function of average load power; typical values**

### 8.1.3 Pulsed CW

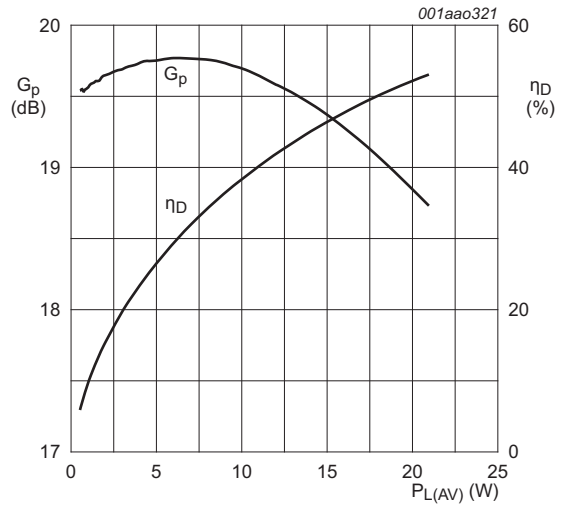



$V_{DS}$ = 32 V; $I_{Dq}$ = 200 mA; f = 1300 MHz

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

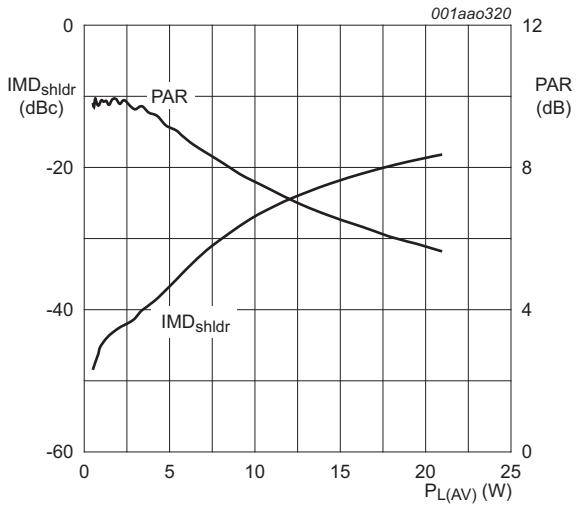

All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

### 8.1.4 DVB-T




$V_{DS}$ = 32 V; $I_{Dq}$ = 200 mA; f = 1300 MHz.

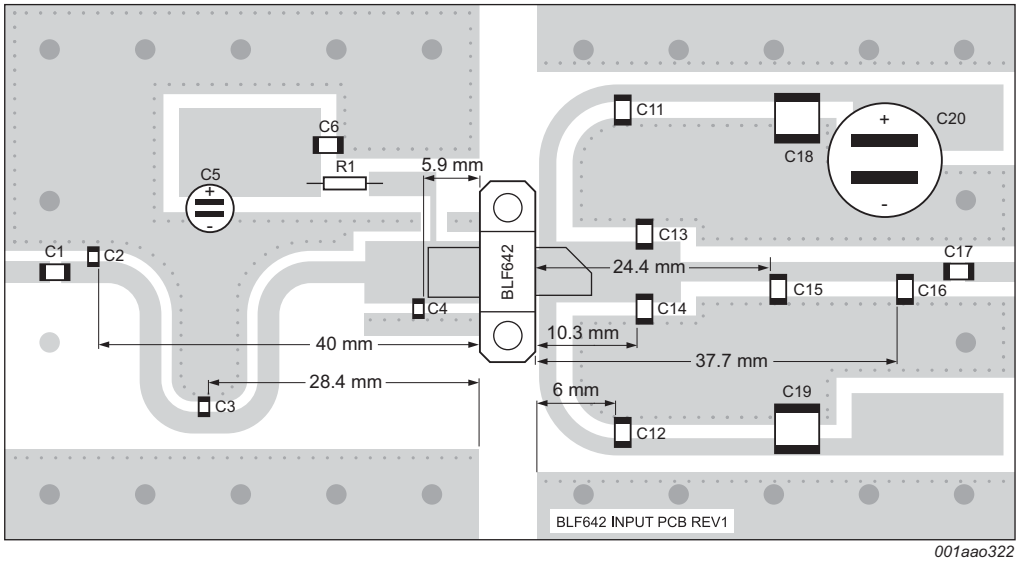
**Fig 6. Power gain and drain efficiency as function of average load power; typical values**




$V_{DS}$ = 32 V; $I_{Dq}$ = 200 mA; f = 1300 MHz.

**Fig 7. PAR and $IMD_{shldr}$ as function of average load power; typical values**

## 8.2 Test circuit




See Table 8 for a list of components.

**Fig 8. Component layout for class-AB amplifier**


All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

**Table 8. List of components**

*For production test circuit, see Figure 8 .*
*Printed-Circuit Board (PCB): Rogers 5880; $\varepsilon_r$ = 2.2; height = 0.762 mm; Copper (top/bottom metallization); thickness copper plating = 35 $\mu$m.*

| Component | Description | Value | Remarks |
|---|---|---|---|
| C1 | multilayer ceramic chip capacitor | 22 pF | [1] |
| C2 | multilayer ceramic chip capacitor | 5.1 pF | [2] |
| C3 | multilayer ceramic chip capacitor | 4.3 pF | [2] |
| C4 | multilayer ceramic chip capacitor | 10 pF | [2] |
| C5 | electrolytic chip capacitor | 10 μF; 50 V | |
| C6 | multilayer ceramic chip capacitor | 22 nF | |
| C11, C12 | multilayer ceramic chip capacitor | 22 pF | [1] |
| C13, C14 | multilayer ceramic chip capacitor | 6.2 pF | [1] |
| C15 | multilayer ceramic chip capacitor | 4.3 pF | [1] |
| C16 | multilayer ceramic chip capacitor | 1.2 pF | [1] |
| C17 | multilayer ceramic chip capacitor | 22 pF | [1] |
| C18, C19 | multilayer ceramic chip capacitor | 10 μF | [3] |
| C20 | electrolytic capacitor | 470 μF; 63 V | |
| R1 | wire resistor | 100 Ω | |

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

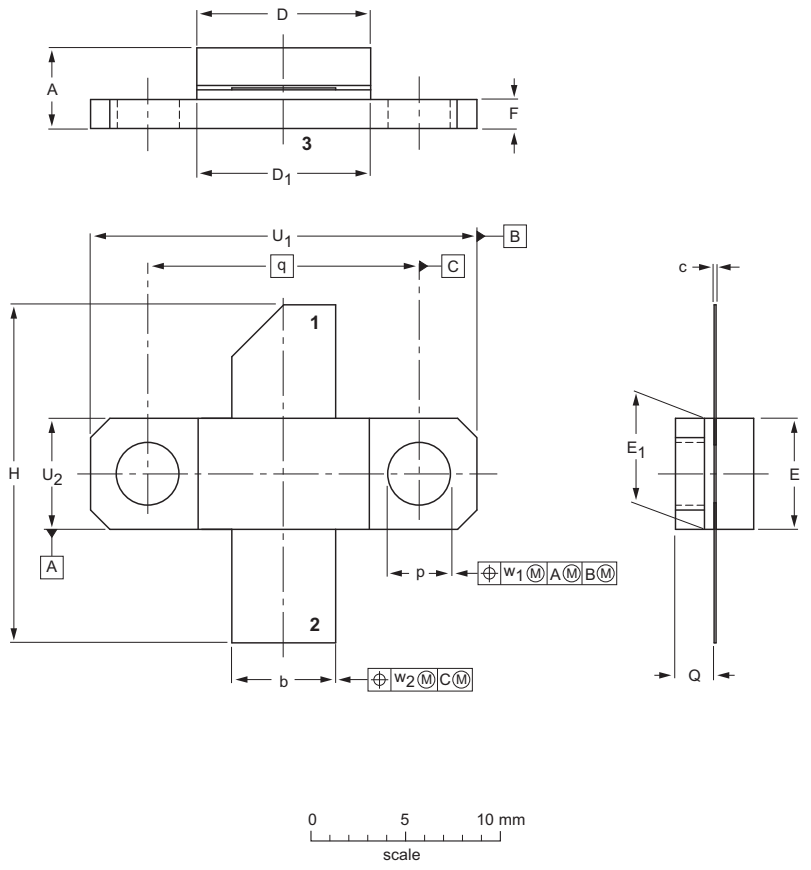
[2] American Technical Ceramics type 100A or capacitor of same quality.

[3] TDK C570X7R1H106KT000N or capacitor of same quality.


All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

# 9. Package outline

**Flanged ceramic package; 2 mounting holes; 2 leads** **SOT467C**




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

| UNIT | A | b | c | D | $D_1$ | E | $E_1$ | F | H | p | Q | q | $U_1$ | $U_2$ | $w_1$ | $w_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 4.67<br>3.94 | 5.59<br>5.33 | 0.15<br>0.10 | 9.25<br>9.04 | 9.27<br>9.02 | 5.92<br>5.77 | 5.97<br>5.72 | 1.65<br>1.40 | 18.54<br>17.02 | 3.43<br>3.18 | 2.21<br>1.96 | 14.27 | 20.45<br>20.19 | 5.97<br>5.72 | 0.25 | 0.51 |
| inch | 0.184<br>0.155 | 0.220<br>0.210 | 0.006<br>0.004 | 0.364<br>0.356 | 0.365<br>0.355 | 0.233<br>0.227 | 0.235<br>0.225 | 0.065<br>0.055 | 0.73<br>0.67 | 0.135<br>0.125 | 0.087<br>0.077 | 0.562 | 0.805<br>0.795 | 0.235<br>0.225 | 0.010 | 0.020 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT467C | | | | | | ~~99-12-28~~<br>12-05-02 |

**Fig 9. Package outline SOT467C**


All information provided in this document is subject to legal disclaimers.

© Ampleon The Netherlands B.V. 2015. All rights reserved.

## 10. Abbreviations

**Table 9. Abbreviations**

| Acronym | Description |
|---|---|
| CW | Continuous Waveform |
| DVB-T | Digital Video Broadcast - Terrestrial |
| ESD | ElectroStatic Discharge |
| HF | High Frequency |
| LDMOS | Laterally Diffused Metal Oxide Semiconductor |
| LDMOST | Laterally Diffused Metal-Oxide Semiconductor Transistor |
| PAR | Peak-to-Average power Ratio |
| RF | Radio Frequency |
| VSWR | Voltage Standing-Wave Ratio |

## 11. Revision history

**Table 10. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BLF642#3 | 20150901 | Product data sheet | - | BLF642 v.2 |
| Modifications: | • The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.<br>• Legal texts have been adapted to the new company name where appropriate. | | | |
| BLF642 v.2 | 20110722 | Product data sheet | - | BLF642 v.1 |
| BLF642 v.1 | 20110308 | Objective data sheet | - | - |


All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

# 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.ampleon.com.

## 12.2 Definitions

**Draft —** The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Ampleon does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet —** A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Ampleon sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification —** The information and data provided in a Product data sheet shall define the specification of the product as agreed between Ampleon and its customer, unless Ampleon and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Ampleon product is deemed to offer functions and qualities beyond those described in the Product data sheet.

## 12.3 Disclaimers

**Limited warranty and liability —** Information in this document is believed to be accurate and reliable. However, Ampleon does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Ampleon takes no responsibility for the content in this document if provided by an information source outside of Ampleon.

In no event shall Ampleon be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Ampleon' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Ampleon.

**Right to make changes —** Ampleon reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use —** Ampleon products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Ampleon product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Ampleon and its suppliers accept no liability for inclusion and/or use of Ampleon products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications —** Applications that are described herein for any of these products are for illustrative purposes only. Ampleon makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Ampleon products, and Ampleon accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Ampleon product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Ampleon does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Ampleon products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Ampleon does not accept any liability in this respect.

**Limiting values —** Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale —** Ampleon products are sold subject to the general terms and conditions of commercial sale, as published at http://www.ampleon.com/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Ampleon hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Ampleon products by customer.

**No offer to sell or license —** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control —** This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.


All information provided in this document is subject to legal disclaimers.

© Ampleon The Netherlands B.V. 2015. All rights reserved.

**Non-automotive qualified products —** Unless this data sheet expressly states that this specific Ampleon product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. Ampleon accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without Ampleon' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond Ampleon' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies Ampleon for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond Ampleon' standard warranty and Ampleon' product specifications.

## 12.4 Licenses

| ICs with DVB-T or DVB-T2 functionality |
| --- |
| Use of this product in any manner that complies with the DVB-T or the DVB-T2 standard may require licenses under applicable patents of the DVB-T respectively the DVB-T2 patent portfolio, which license is available from Sisvel S.p.A., Via Sestriere 100, 10060 None (TO), Italy, and under applicable patents of other parties. |

## 12.5 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

Any reference or use of any 'NXP' trademark in this document or in or on the surface of Ampleon products does not result in any claim, liability or entitlement vis-à-vis the owner of this trademark. Ampleon is no longer part of the NXP group of companies and any reference to or use of the 'NXP' trademarks will be replaced by reference to or use of Ampleon's own Any reference or use of any 'NXP' trademark in this document or in or on the surface of Ampleon products does not result in any claim, liability or entitlement vis-à-vis the owner of this trademark. Ampleon is no longer part of the NXP group of companies and any reference to or use of the 'NXP' trademarks will be replaced by reference to or use of Ampleon's own trademarks.

# 13. Contact information

For more information, please visit:
http://www.ampleon.com

For sales office addresses, please visit:
http://www.ampleon.com/sales


All information provided in this document is subject to legal disclaimers.
© Ampleon The Netherlands B.V. 2015. All rights reserved.

## 14. Contents

**1 Product profile . . . . . 1**
1.1 General description . . . . . 1
1.2 Features and benefits . . . . . 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
**8 Test information . . . . . 4**
8.1 RF performance . . . . . 4
8.1.1 1-Tone CW . . . . . 4
8.1.2 2-Tone CW . . . . . 5
8.1.3 Pulsed CW . . . . . 5
8.1.4 DVB-T . . . . . 6
8.2 Test circuit . . . . . 6
**9 Package outline . . . . . 8**
**10 Abbreviations . . . . . 9**
**11 Revision history . . . . . 9**
**12 Legal information . . . . . 10**
12.1 Data sheet status . . . . . 10
12.2 Definitions . . . . . 10
12.3 Disclaimers . . . . . 10
12.4 Licenses . . . . . 11
12.5 Trademarks . . . . . 11
**13 Contact information . . . . . 11**
**14 Contents . . . . . 12**

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

**© Ampleon The Netherlands B.V. 2015. All rights reserved.**

For more information, please visit: http://www.ampleon.com
For sales office addresses, please visit: http://www.ampleon.com/sales

**Date of release: 1 September 2015**
**Document identifier: BLF642#3**

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

# Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

### Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

**www.entegreci.com**

### Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

**Kategorilere göz atın**

### Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

**Üreticileri görün**

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

**Teklif isteyin**

**www.entegreci.com** | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.