

# BLF640

## Broadband power LDMOS transistor

Rev. 2 — 11 April 2013

Product data sheet

## 1. Product profile

### 1.1 General description

10 W LDMOS power transistor for applications at frequencies from HF to 2200 MHz

**Table 1. Typical performance**

$I_{DQ} = 100 \text{ mA}$ ;  $T_{case} = 25 \text{ }^\circ\text{C}$  in a common source class-AB production test circuit.

Test signal	f (MHz)	V <sub>DS</sub> (V)	P <sub>L(AV)</sub> (W)	G <sub>p</sub> (dB)	$\eta_D$ (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	28	0.7	18.5	15	-50 <a href="#">[1]</a>
1-carrier W-CDMA	2110 to 2170	28	2	19.3	31	-39 <a href="#">[1]</a>

[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.

### 1.2 Features and benefits

- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- No internal matching for broadband operation
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

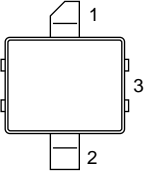
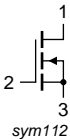
### 1.3 Applications

- RF power amplifiers for applications in the HF to 2200 MHz frequency range
- Broadcast drivers



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF640	-	ceramic surface-mounted package; 2 leads	SOT538A

## 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
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_{L(AV)} = 11\text{ W}$	[1] 3.2	K/W

[1] Thermal resistance is determined under specified RF operating conditions

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 18\text{ mA}$	1.4	1.9	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	3.1	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	150	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 0.9\text{ A}$	-	0.5	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 0.625\text{ A}$	-	0.4	-	$\Omega$

**Table 7. AC characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{rs}$	feedback capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}; f = 1\text{ MHz}$	-	0.5	-	pF

**Table 8. RF characteristics**

PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}; T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Test signal: 2-carrier W-CDMA</b>		<b><math>f_1 = 2112.5\text{ MHz}; f_2 = 2117.5\text{ MHz}; f_3 = 2162.5\text{ MHz}; f_4 = 2167.5\text{ MHz}</math></b>				
$G_p$	power gain	$P_{L(AV)} = 0.7\text{ W}$	-	18.5	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 0.7\text{ W}$	-	15	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 0.7\text{ W}$	-	-50	-	dBc
<b>Test signal: 1-carrier W-CDMA</b>		<b><math>f_1 = 2112.5\text{ MHz}; f_2 = 2167.5\text{ MHz}</math></b>				
$G_p$	power gain	$P_{L(AV)} = 2\text{ W}$	17.3	19.3	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 2\text{ W}$	29	31	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 2\text{ W}$	-	-39	-36	dBc

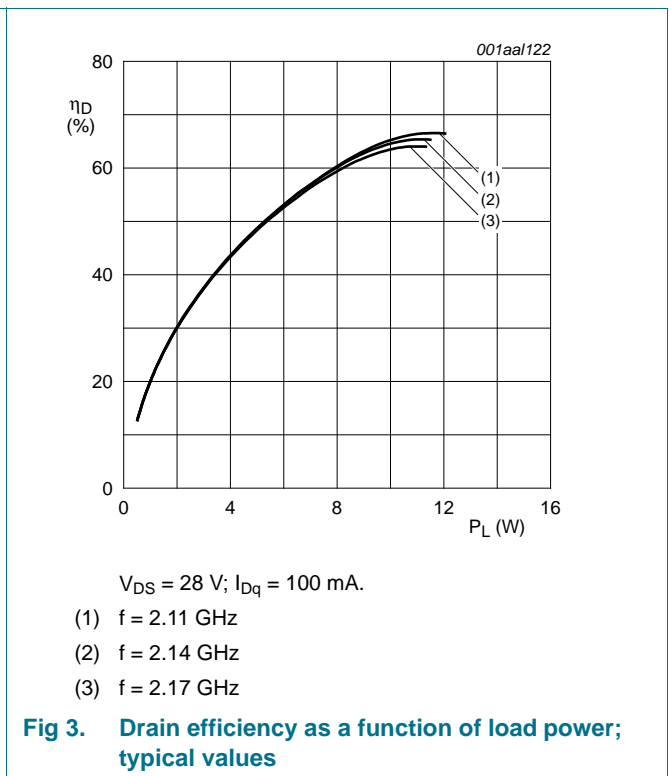
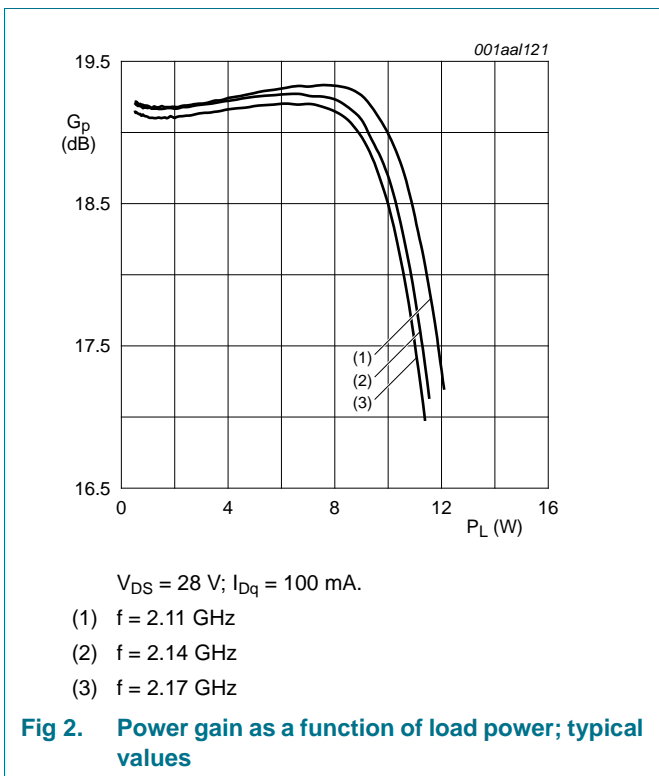
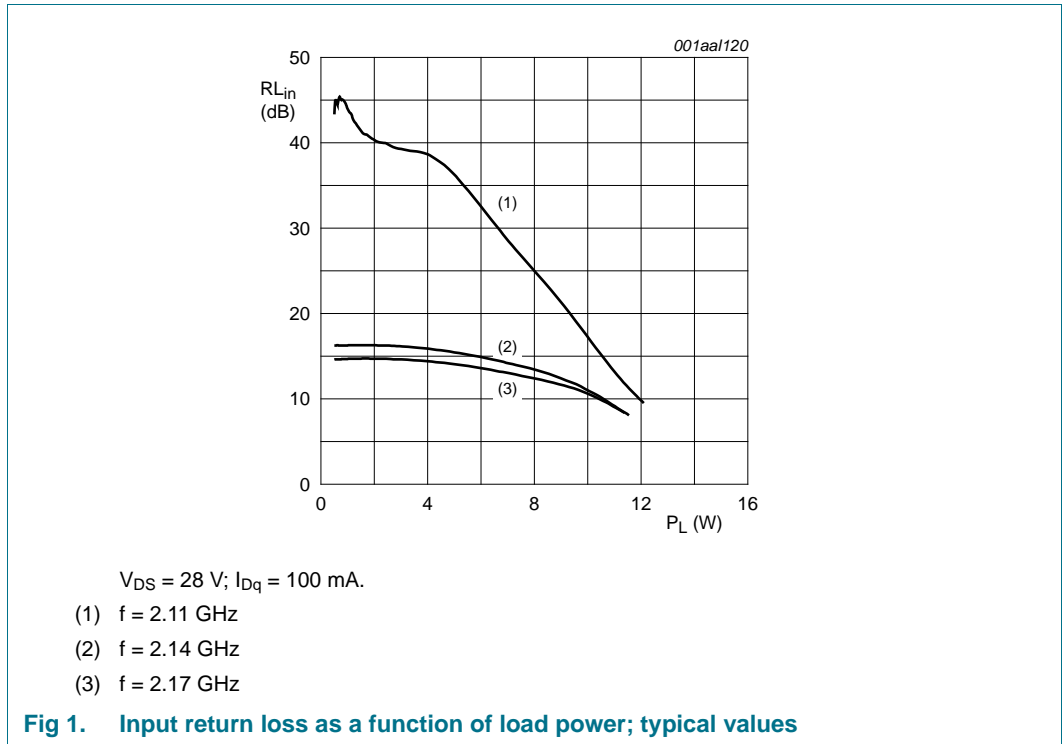
## 7. Test information

### 7.1 Ruggedness in class-AB operation

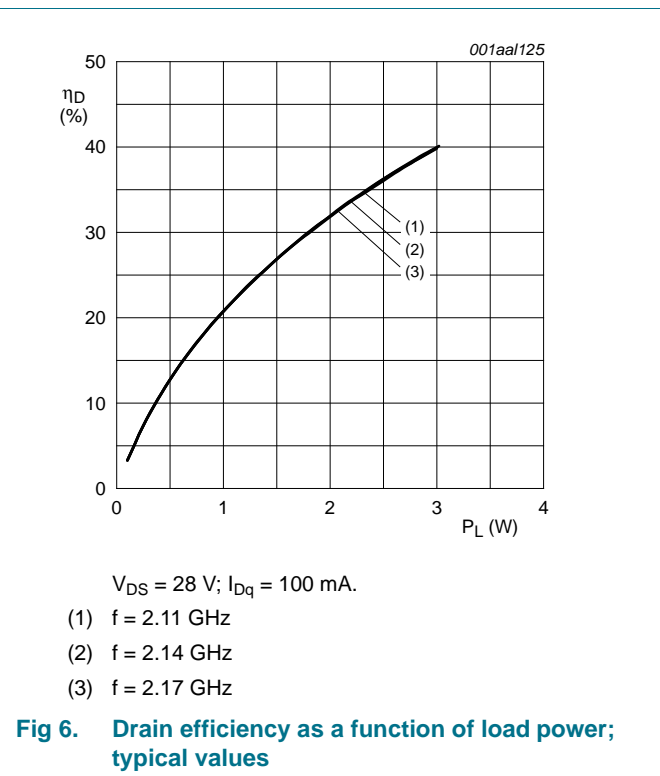
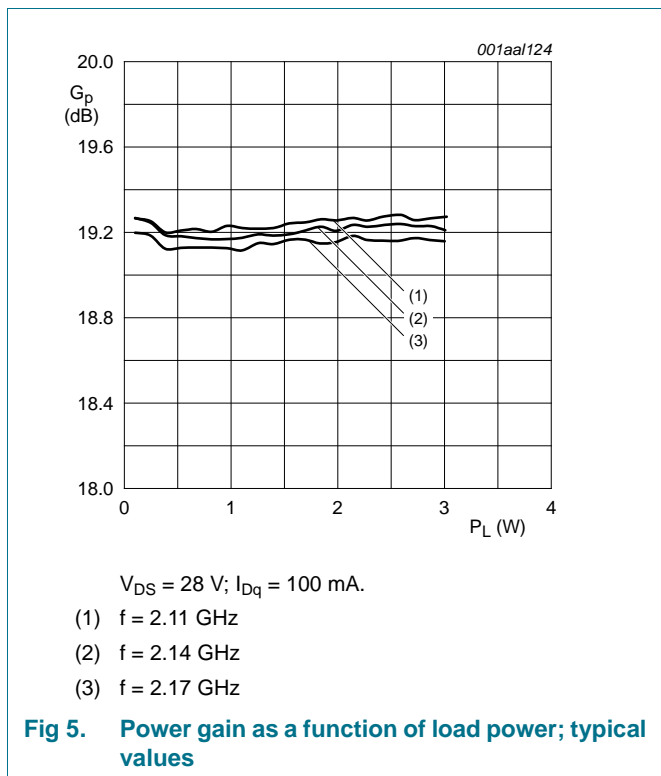
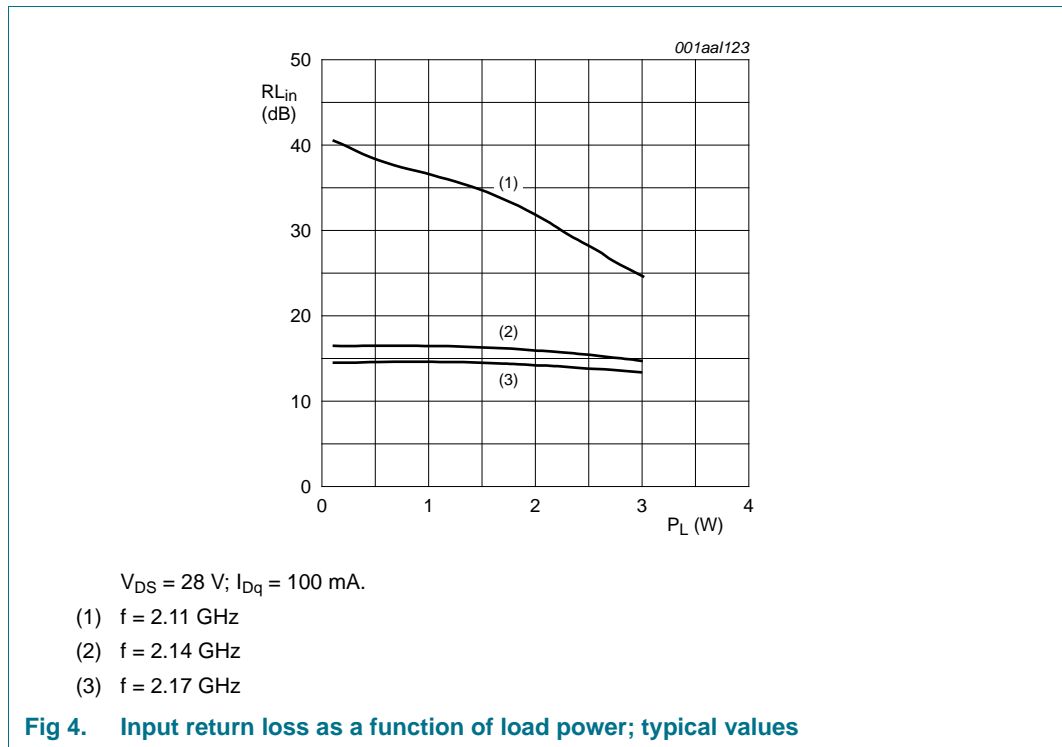
The BLF640 is capable of withstanding a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}; f = 2140\text{ MHz}$  at  $P_L = 10\text{ W}$ .

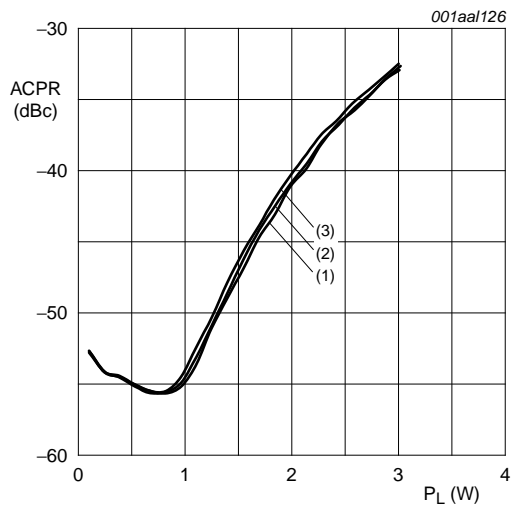
7.2 Graphical data

7.2.1 CW



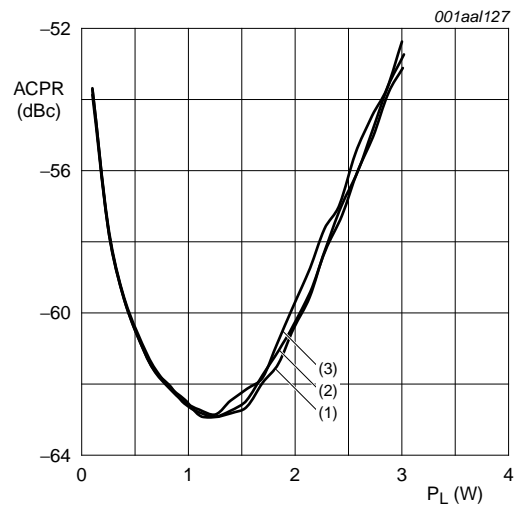
7.2.2 1-Carrier W-CDMA





$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 100\text{ mA}$ ; carrier spacing 5 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

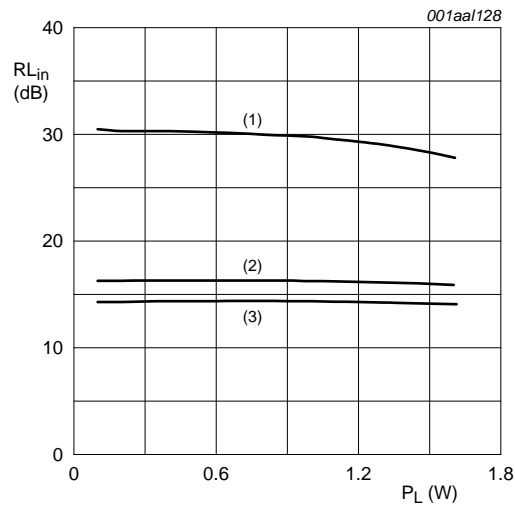
**Fig 7. Adjacent channel power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 100\text{ mA}$ ; carrier spacing 10 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

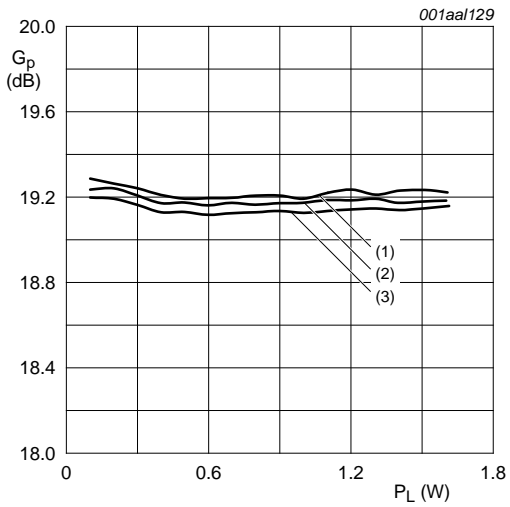
**Fig 8. Adjacent channel power ratio as a function of load power; typical values**

7.2.3 2-Carrier W-CDMA



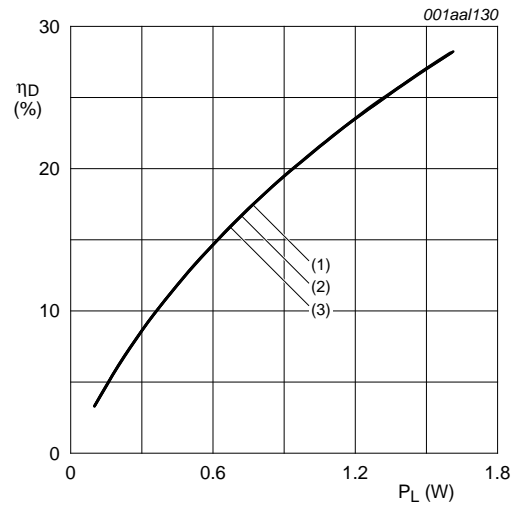
$V_{DS} = 28\text{ V}$ ;  $I_{DQ} = 100\text{ mA}$ .  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 9. Input return loss as a function of load power; typical values**



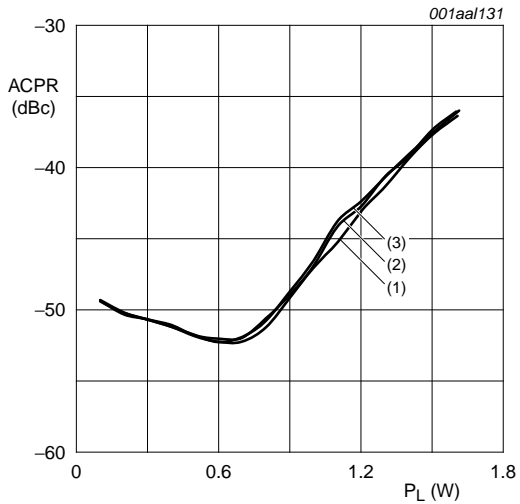
$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}$ .  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 10. Power gain as a function of load power; typical values**



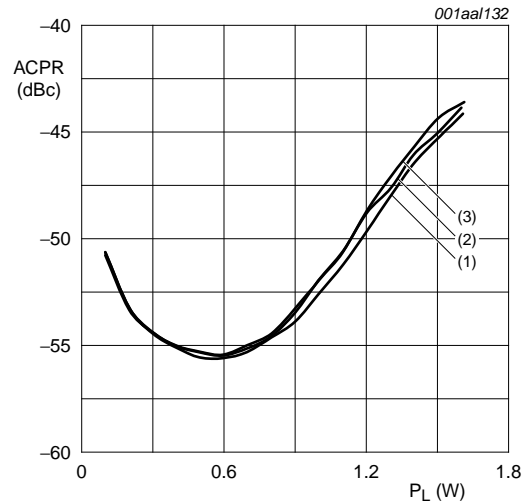
$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}$ .  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 11. Drain efficiency as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA};$  carrier spacing 5 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 12. Adjacent channel power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA};$  carrier spacing 10 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

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

8. Package outline

Ceramic surface-mounted package; 2 leads

SOT538A

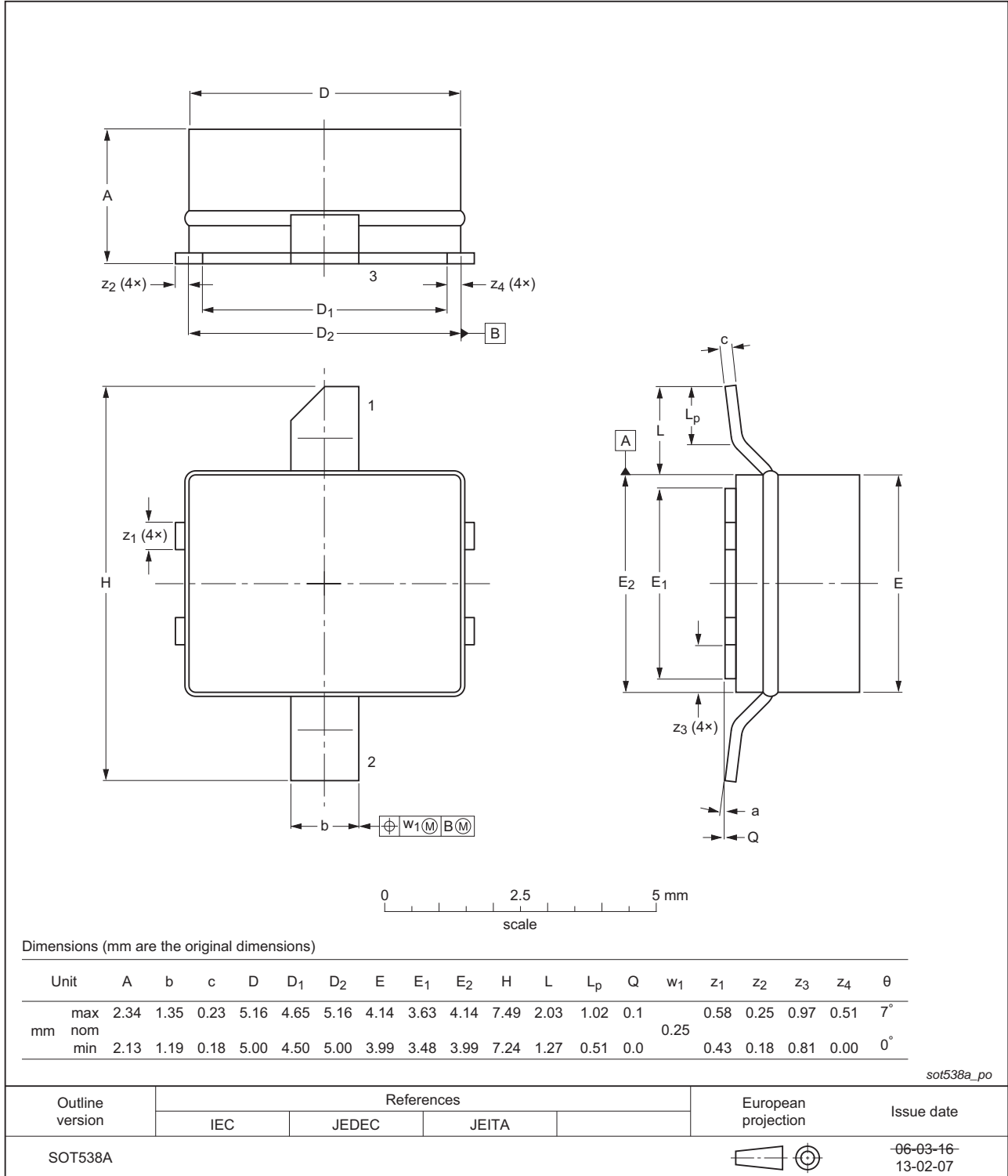


Fig 14. Package outline SOT538A



## 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 9. Abbreviations**

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
HF	High Frequency
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
PHS	Personal Handy-phone System
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
BLF640 v.2	20130411	Product data sheet	-	BLF640 v.1
Modifications:	<ul style="list-style-type: none"> <li>Package outline drawings have been updated to the latest version.</li> </ul>			
BLF640 v.1	20121207	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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

<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features and benefits . . . . .	1
1.3	Applications . . . . .	1
<b>2</b>	<b>Pinning information</b> . . . . .	<b>2</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Limiting values</b> . . . . .	<b>2</b>
<b>5</b>	<b>Thermal characteristics</b> . . . . .	<b>2</b>
<b>6</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Test information</b> . . . . .	<b>3</b>
7.1	Ruggedness in class-AB operation . . . . .	3
7.2	Graphical data . . . . .	4
7.2.1	CW . . . . .	4
7.2.2	1-Carrier W-CDMA . . . . .	5
7.2.3	2-Carrier W-CDMA . . . . .	6
<b>8</b>	<b>Package outline</b> . . . . .	<b>8</b>
<b>9</b>	<b>Handling information</b> . . . . .	<b>9</b>
<b>10</b>	<b>Abbreviations</b> . . . . .	<b>9</b>
<b>11</b>	<b>Revision history</b> . . . . .	<b>9</b>
<b>12</b>	<b>Legal information</b> . . . . .	<b>10</b>
12.1	Data sheet status . . . . .	10
12.2	Definitions . . . . .	10
12.3	Disclaimers . . . . .	10
12.4	Trademarks . . . . .	11
<b>13</b>	<b>Contact information</b> . . . . .	<b>11</b>
<b>14</b>	<b>Contents</b> . . . . .	<b>12</b>

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