

# BLL6H0514-25

LDMOS driver transistor

Rev. 04 — 30 March 2010

Product data sheet

## 1. Product profile

### 1.1 General description

25 W LDMOS transistor intended for pulsed applications in the 0.5 GHz to 1.4 GHz range.

**Table 1. Application information**

Typical RF performance at  $T_{case} = 25\text{ °C}$ ;  $I_{Dq} = 50\text{ mA}$ ; in a class-AB application circuit.

Mode of operation	f (MHz)	t <sub>p</sub> (μs)	δ (%)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	RL <sub>in</sub> (dB)	η <sub>D</sub> (%)	P <sub>droop(pulse)</sub> (dB)	t <sub>r</sub> (ns)	t <sub>f</sub> (ns)
pulsed RF	960 to 1215	128	10	50	25	21	10	58	0.05	8	6
	1200 to 1400	300	10	50	25	19	10	50	0.05	8	6

#### CAUTION



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

### 1.2 Features and benefits

- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (0.5 GHz to 1.4 GHz)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

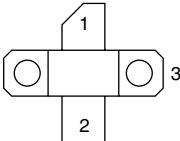
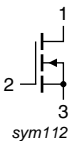
### 1.3 Applications

- Amplifiers for pulsed applications in the 0.5 GHz to 1.4 GHz frequency range



## 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
BLL6H0514-25	-	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		-	100	V
$V_{GS}$	gate-source voltage		-0.5	+13	V
$I_D$	drain current		-	2.5	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_{case} = 85\text{ °C}; P_L = 25\text{ W}$		
		$t_p = 100\text{ }\mu\text{s}; \delta = 10\%$	0.86	K/W
		$t_p = 200\text{ }\mu\text{s}; \delta = 10\%$	1.11	K/W
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\%$	1.29	K/W
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\%$	1.15	K/W

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ °C}$ ; per section unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 630\text{ mA}$	110	-	-	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	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$	-	-	1	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	2.1	2.5	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	100	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 18\text{ mA}$	120	150	-	mS
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 63\text{ mA}$	-	1500	2750	$\text{m}\Omega$

**Table 7. RF characteristics**

Mode of operation: pulsed RF;  $t_p = 128\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ; RF performance at  $V_{DS} = 50\text{ V}$ ;  $I_{DQ} = 50\text{ mA}$ ;  $f = 1.2\text{ GHz}$ ;  $T_{case} = 25\text{ °C}$ ; unless otherwise specified, in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_L$	output power		25	-	-	W
$V_{DS}$	drain-source voltage	$P_L = 25\text{ W}$	-	-	50	V
$G_p$	power gain	$P_L = 25\text{ W}$	20	21	-	dB
$RL_{in}$	input return loss	$P_L = 25\text{ W}$	10	15	-	dB
$\eta_D$	drain efficiency	$P_L = 25\text{ W}$	57	59	-	%
$P_{\text{droop(pulse)}}$	pulse droop power	$P_L = 25\text{ W}$	-	0	0.3	dB
$t_r$	rise time	$P_L = 25\text{ W}$	-	20	50	ns
$t_f$	fall time	$P_L = 25\text{ W}$	-	6	50	ns

### 6.1 Ruggedness in class-AB operation

The BLL6H0514-25 is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 50\text{ V}$ ;  $I_{DQ} = 50\text{ mA}$ ;  $P_L = 25\text{ W}$ ;  $f = 1.2\text{ GHz}$ ;  $t_p = 128\text{ }\mu\text{s}$ ;  $\delta = 10\%$ .

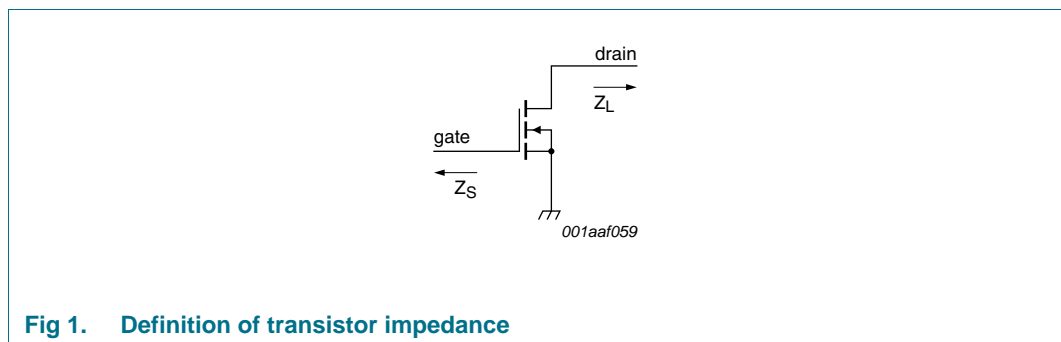
## 7. Application information

### 7.1 Impedance information

**Table 8. Typical impedance**

Typical values per section unless otherwise specified.

f MHz	Z <sub>S</sub> Ω	Z <sub>L</sub> Ω
950	2.37 + j3.3	6.11 + j11.1
1000	2.44 + j2.65	7.00 + j16.0
1050	2.34 + j2.67	7.39 + j14.2
1100	2.56 + j2.06	7.0 + j16.0
1150	2.54 + j1.70	5.77 + j13.85
1200	2.25 + j1.29	7.39 + j14.2
1300	2.21 + j0.15	6.11 + j11.1
1400	2.46 – j0.52	5.00 + j10.0



**Fig 1. Definition of transistor impedance**

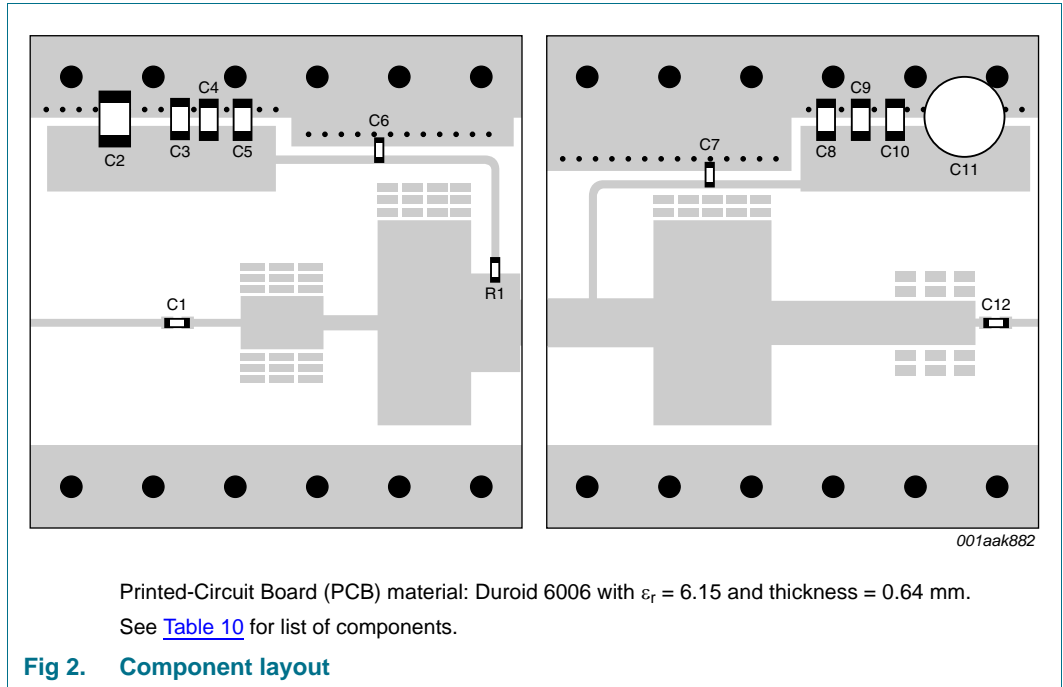
### 7.2 Typical data

**Table 9. Application information**

Typical RF performance at  $T_{case} = 25\text{ °C}$ ;  $I_{DQ} = 50\text{ mA}$ ; in a class-AB application circuit.

Mode of operation	f (MHz)	t <sub>p</sub> (μs)	δ (%)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	RL <sub>in</sub> (dB)	η <sub>D</sub> (%)	P <sub>droop(pulse)</sub> (dB)	t <sub>r</sub> (ns)	t <sub>f</sub> (ns)
pulsed RF	960 to 1215	128	10	50	25	21	10	58	0.05	8	6
	1200 to 1400	300	10	50	25	19	10	50	0.05	8	6

**7.3 Application circuit**



**Table 10. List of components**

See [Figure 2](#) for component layout.

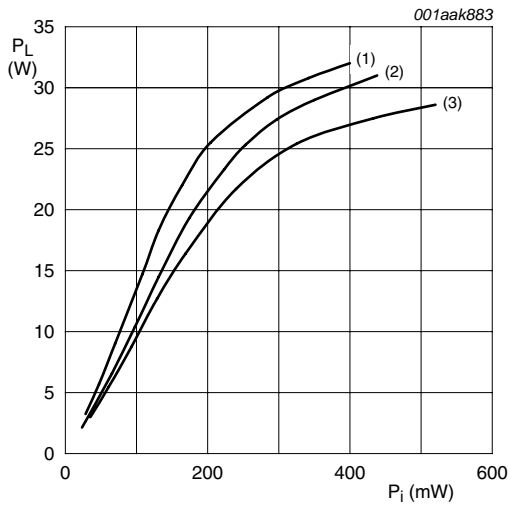
Component	Description	Value	Remarks
C1, C6, C7, C12	multilayer ceramic chip capacitor	56 pF	[1]
C2	multilayer ceramic chip capacitor	10 $\mu$ F; 25 V	
C3, C4, C8, C9	multilayer ceramic chip capacitor	100 pF	[1]
C5, C10	multilayer ceramic chip capacitor	1 nF	[2]
C11	electrolytic capacitor	68 $\mu$ F; 63 V	
R1	SMD resistor	10 $\Omega$	SMD 0603

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

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

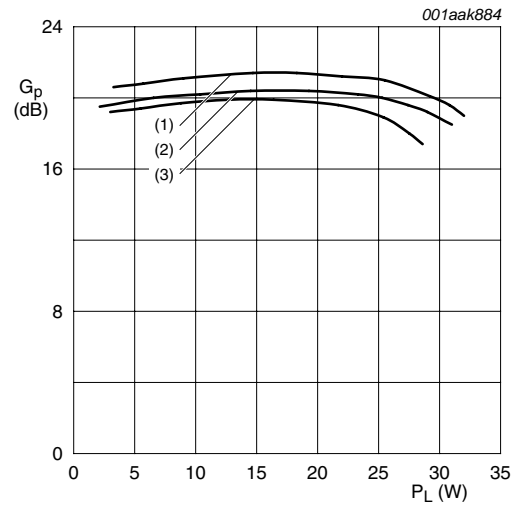
**8. Test information**

**8.1 Performance curves**



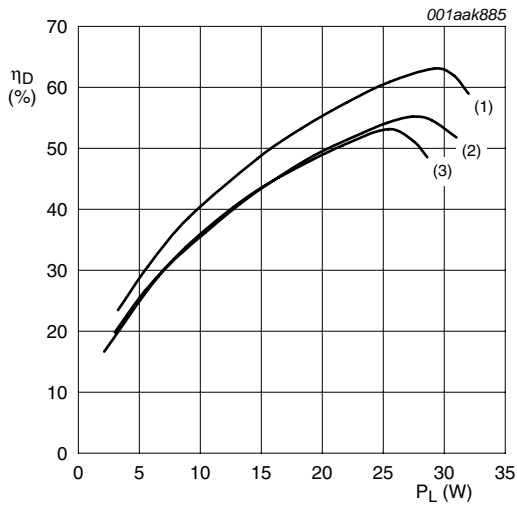
$V_{DS} = 50\text{ V}; I_{Dq} = 50\text{ mA}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 1200\text{ MHz}$   
 (2)  $f = 1300\text{ MHz}$   
 (3)  $f = 1400\text{ MHz}$

**Fig 3. Load power as a function of input power; typical values**



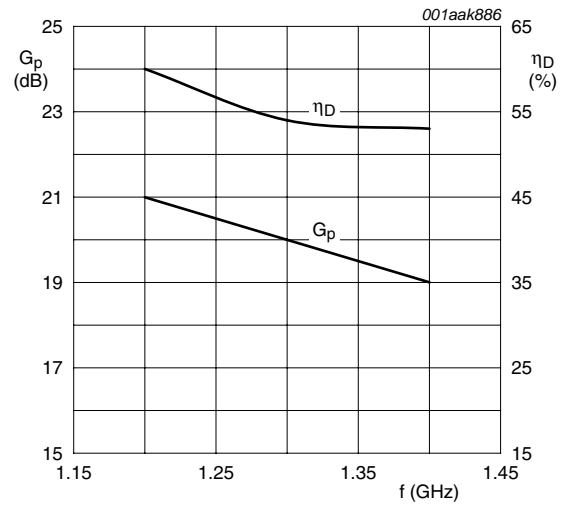
$V_{DS} = 50\text{ V}; I_{Dq} = 50\text{ mA}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 1200\text{ MHz}$   
 (2)  $f = 1300\text{ MHz}$   
 (3)  $f = 1400\text{ MHz}$

**Fig 4. Power gain as a function of load power; typical values**



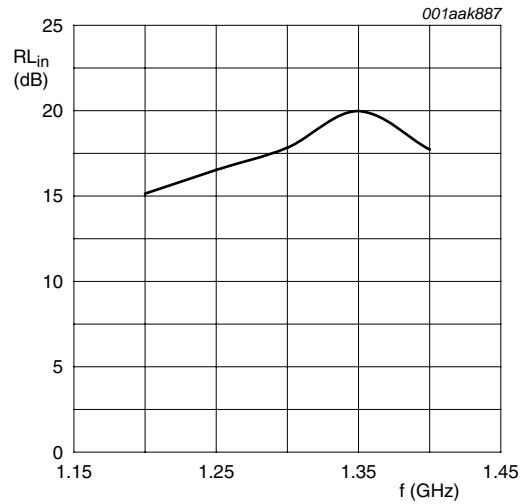
$V_{DS} = 50\text{ V}; I_{DQ} = 50\text{ mA}; t_p = 300\ \mu\text{s}; \delta = 10\%$   
 (1)  $f = 1200\text{ MHz}$   
 (2)  $f = 1300\text{ MHz}$   
 (3)  $f = 1400\text{ MHz}$

**Fig 5. Drain efficiency as a function of load power; typical values**



$V_{DS} = 50\text{ V}; I_{DQ} = 50\text{ mA}; t_p = 300\ \mu\text{s}; \delta = 10\%$

**Fig 6. Power gain and drain efficiency as function of frequency; typical values**



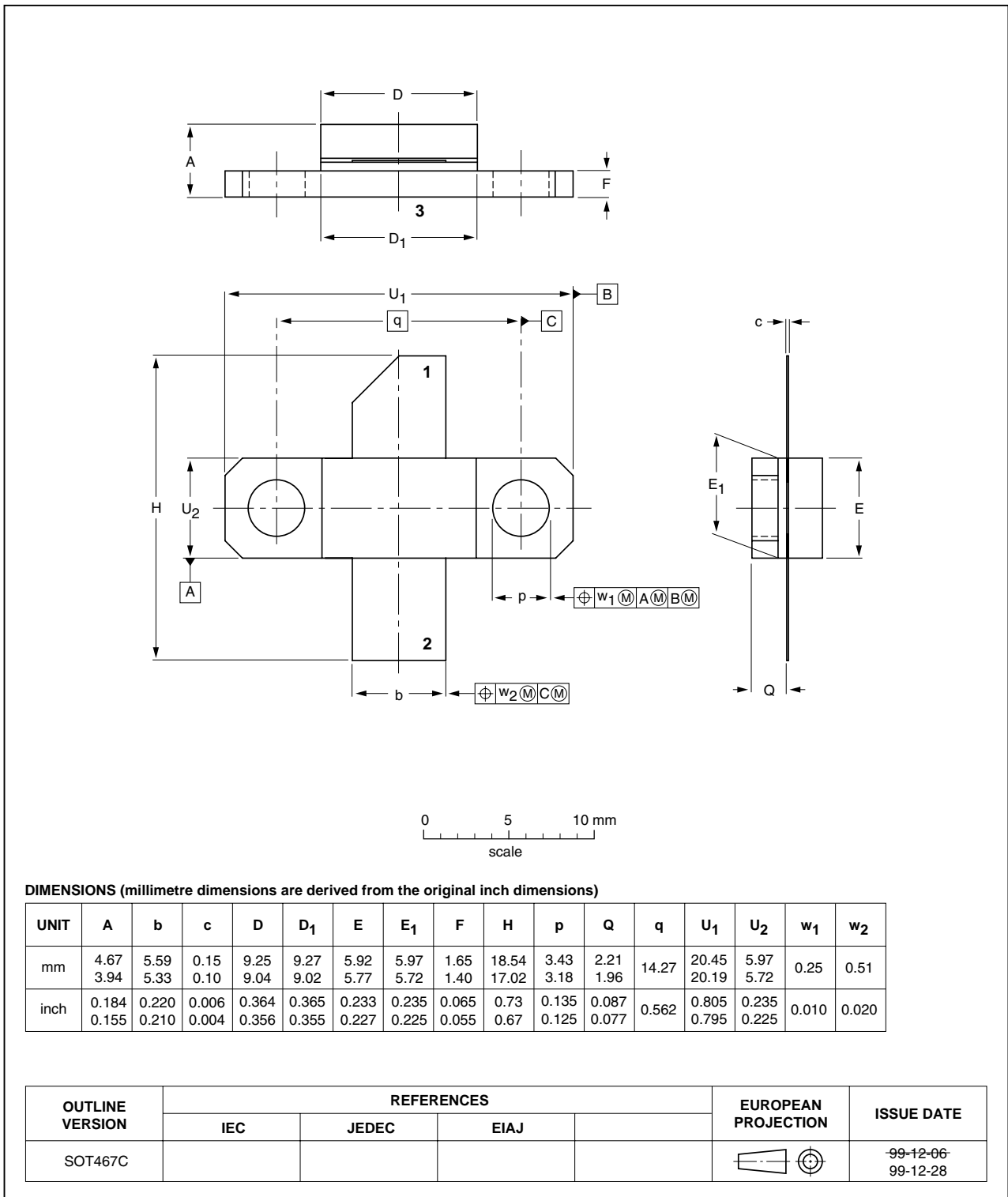
$P_L = 25\text{ W}; V_{DS} = 50\text{ V}; I_{DQ} = 50\text{ mA}; t_p = 300\ \mu\text{s}; \delta = 10\%$

**Fig 7. Input return loss as a function of frequency; typical values**

**9. Package outline**

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT467C



**Fig 8. Package outline SOT467C**



## 10. Abbreviations

Table 11. Abbreviations

Acronym	Description
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
RF	Radio Frequency
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
BLL6H0514-25_4	20100330	Product data sheet	-	BLL6H0514-25_3
Modifications:	• <a href="#">Figure 3 on page 6</a> : the unit on the X-axis is corrected to mW.			
BLL6H0514-25_3	20100223	Product data sheet	-	BLL6H0514-25_2
BLL6H0514-25_2	20090317	Objective data sheet	-	BLL6H0514-25_1
BLL6H0514-25_1	20090305	Objective data sheet	-	-

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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.
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**14. Contents**

**1 Product profile . . . . . 1**

1.1 General description . . . . . 1

1.2 Features and benefits . . . . . 1

1.3 Applications . . . . . 1

**2 Pinning information . . . . . 2**

**3 Ordering information . . . . . 2**

**4 Limiting values . . . . . 2**

**5 Thermal characteristics . . . . . 2**

**6 Characteristics . . . . . 3**

6.1 Ruggedness in class-AB operation . . . . . 3

**7 Application information . . . . . 4**

7.1 Impedance information . . . . . 4

7.2 Typical data . . . . . 4

7.3 Application circuit . . . . . 5

**8 Test information . . . . . 6**

8.1 Performance curves . . . . . 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 Trademarks . . . . . 11

**13 Contact information . . . . . 11**

**14 Contents . . . . . 12**

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