

# BLL8H0514L-130; BLL8H0514LS-130

LDMOS driver transistor

Rev. 2 — 9 February 2015

Product data sheet

## 1. Product profile

### 1.1 General description

130 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.

Test signal	f	t <sub>p</sub>	δ	V <sub>DS</sub>	P <sub>L</sub>	G <sub>p</sub>	RL <sub>in</sub>	η <sub>D</sub>	P <sub>droop(pulse)</sub>	t <sub>r</sub>	t <sub>f</sub>
	(MHz)	(μs)	(%)	(V)	(W)	(dB)	(dB)	(%)	(dB)	(ns)	(ns)
pulsed RF	960 to 1215	128	10	50	130	19	10	54	0	15	8
	1200 to 1400	300	10	50	130	17	10	50	0	15	8

### 1.2 Features and benefits

- Easy power control
- Integrated dual side 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)

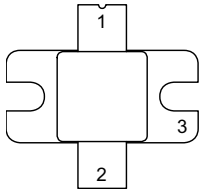
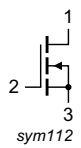
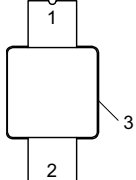
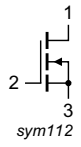
### 1.3 Applications

- 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
<b>BLL8H0514L-130 (SOT1135A)</b>			
1	drain		 sym112
2	gate		
3	source <sup>[1]</sup>		
<b>BLL8H0514LS-130 (SOT1135B)</b>			
1	drain		 sym112
2	gate		
3	source <sup>[1]</sup>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLL8H0514L-130	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT1135A
BLL8H0514LS-130	-	earless flanged ceramic package; 2 leads	SOT1135B

## 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		-6	+13	V
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature	<sup>[1]</sup>	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability, for details refer to the on-line MTF calculator.

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_{case} = 85\text{ °C}; P_L = 130\text{ W}$		
		$t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.17	K/W
		$t_p = 200\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.22	K/W
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.25	K/W
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ }\%$	0.23	K/W
		$t_p = 1\text{ ms}; \delta = 10\text{ }\%$	0.36	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	$V_{GS} = 0\text{ V}; I_D = 630\text{ mA}$	100	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 135\text{ mA}$	1.3	1.8	2.25	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	15.8	18	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	140	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 135\text{ mA}$	806	-	1578	mS
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 6.25\text{ V}; I_D = 135\text{ mA}$	-	200	275	m $\Omega$

**Table 7. RF characteristics**

Test signal: pulsed RF;  $t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ ; RF performance at  $V_{DS} = 50\text{ V}; I_{DQ} = 50\text{ mA}$ ;  $f = 1.2\text{ GHz to }1.4\text{ GHz}; T_{case} = 25\text{ °C}$ ; unless otherwise specified, in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{DS}$	drain-source voltage	$P_L = 130\text{ W}$	-	-	50	V
$G_p$	power gain	$P_L = 130\text{ W}$	15	17	-	dB
$RL_{in}$	input return loss	$P_L = 130\text{ W}$	-	-10	-7	dB
$\eta_D$	drain efficiency	$P_L = 130\text{ W}$	45	50	-	%
$P_{droop(pulse)}$	pulse droop power	$P_L = 130\text{ W}$	-	0	0.3	dB
$t_r$	rise time	$P_L = 130\text{ W}$	-	20	50	ns
$t_f$	fall time	$P_L = 130\text{ W}$	-	6	50	ns

## 7. Application information

### 7.1 Ruggedness in class-AB operation

The BLL8H0514L-130 and BLL8H0514LS-130 are capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions:  $V_{DS} = 50\text{ V}$ ;  $I_{DQ} = 50\text{ mA}$ ;  $P_L = 130\text{ W}$ ;  $f = 1.2\text{ GHz to }1.4\text{ GHz}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

### 7.2 Impedance information

Table 8. Typical impedance

f (MHz)	Z <sub>S</sub> ( $\Omega$ )	Z <sub>L</sub> ( $\Omega$ )
1200	1.21 – j3.44	2.40 – j0.63
1300	1.56 – j4.49	2.30 – j0.87
1400	2.21 – j4.86	2.00 – j1.71

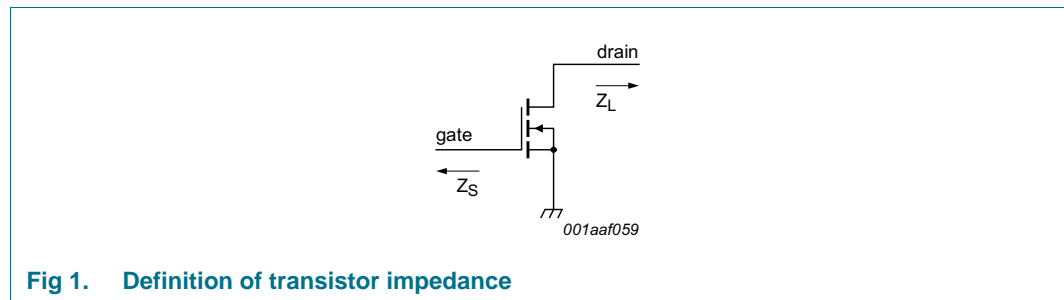
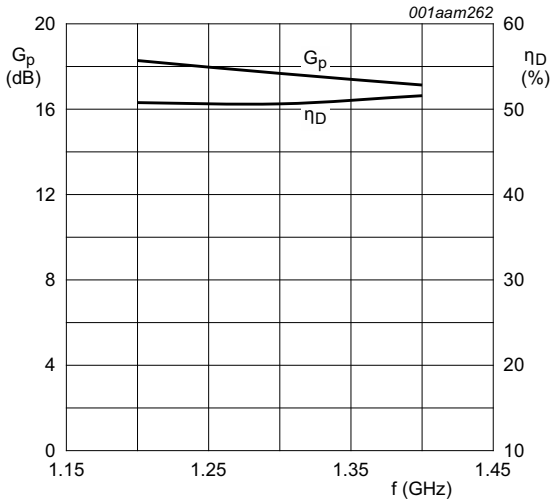


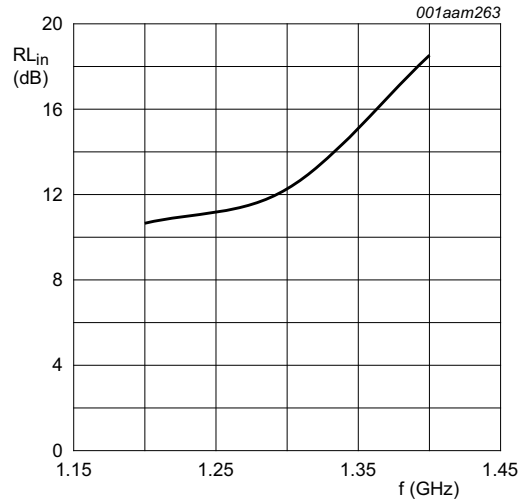
Fig 1. Definition of transistor impedance

**7.3 Performance curves**



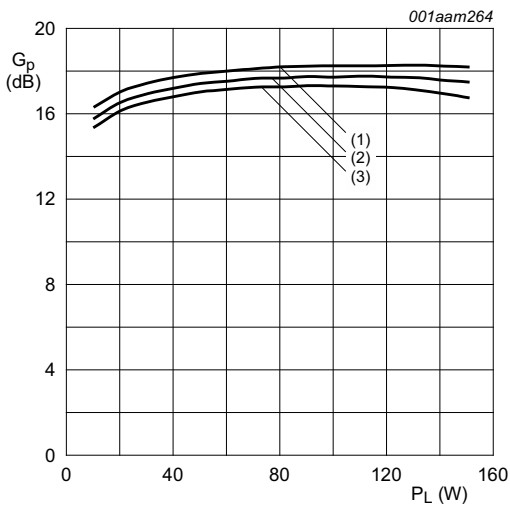
$V_{DS} = 50\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 300\ \mu\text{s}$ ;  $\delta = 10\%$ .

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



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

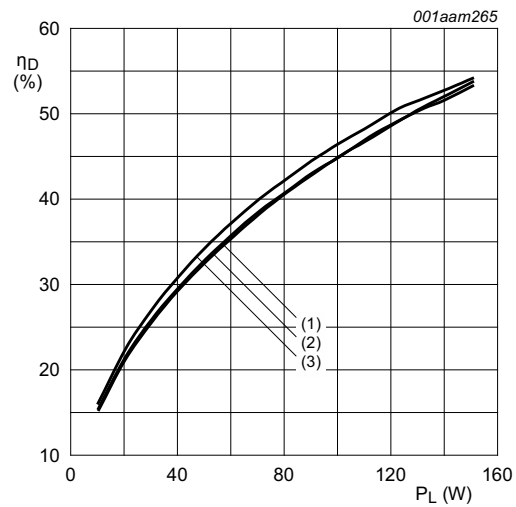
**Fig 3. Input return loss as a function of frequency; typical values**



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

- (1)  $f = 1.2\text{ GHz}$
- (2)  $f = 1.3\text{ GHz}$
- (3)  $f = 1.4\text{ GHz}$

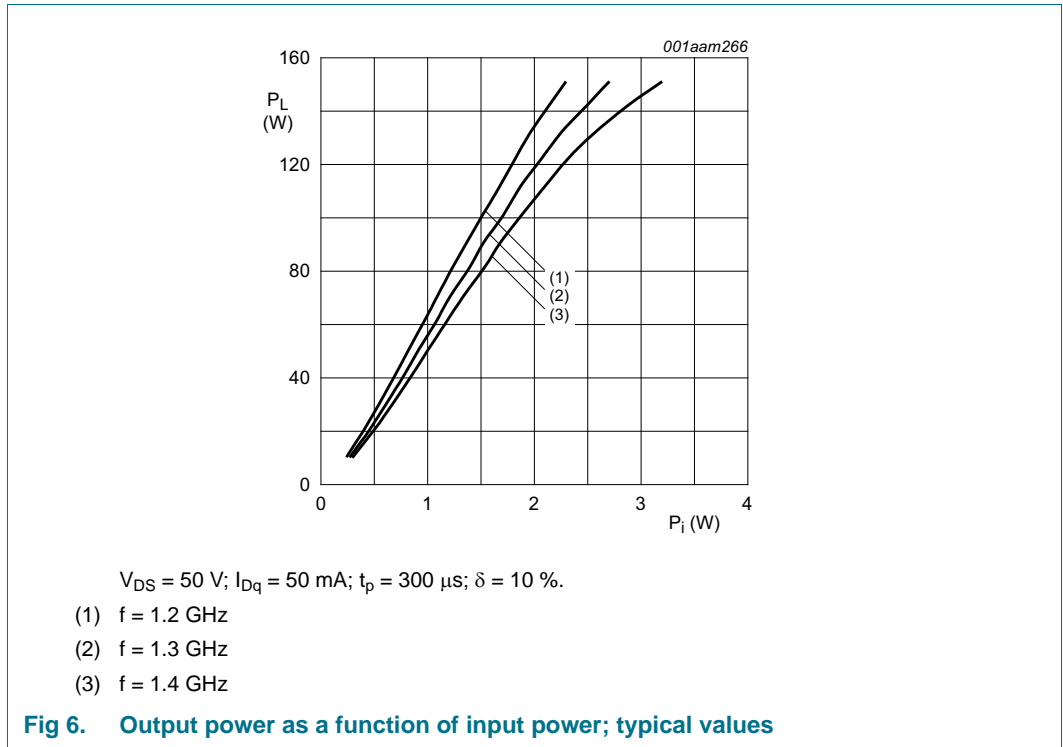
**Fig 4. Power gain as a function of output power; typical values**



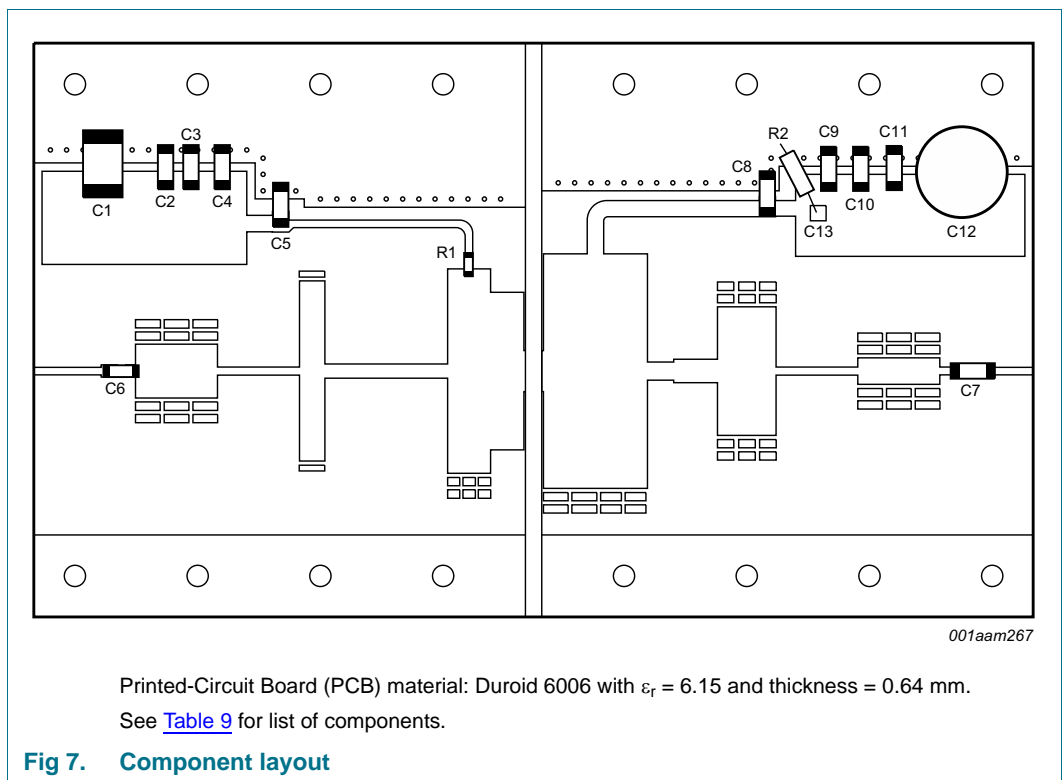
$V_{DS} = 50\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 300\ \mu\text{s}$ ;  $\delta = 10\%$ .

- (1)  $f = 1.2\text{ GHz}$
- (2)  $f = 1.3\text{ GHz}$
- (3)  $f = 1.4\text{ GHz}$

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



## 8. Test information



**Table 9. List of components**See [Figure 7](#) for component layout.

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	10 $\mu$ F, 50 V	
C2, C11	multilayer ceramic chip capacitor	1 nF	[1]
C3, C4, C6, C9, C10	multilayer ceramic chip capacitor	100 pF	[2]
C5, C7, C8	multilayer ceramic chip capacitor	43 pF	[2]
C12	electrolytic capacitor	220 $\mu$ F, 63 V	
C13	multilayer ceramic chip capacitor	1 nF	[3] fitted vertically in series with R2
R1	SMD resistor	10 $\Omega$	SMD 0603
R2	wirewound lead resistor	2.61 $\Omega$ , 0.25 W	fitted in series with C13

[1] American Technical Ceramics type 700A or capacitor of same quality.

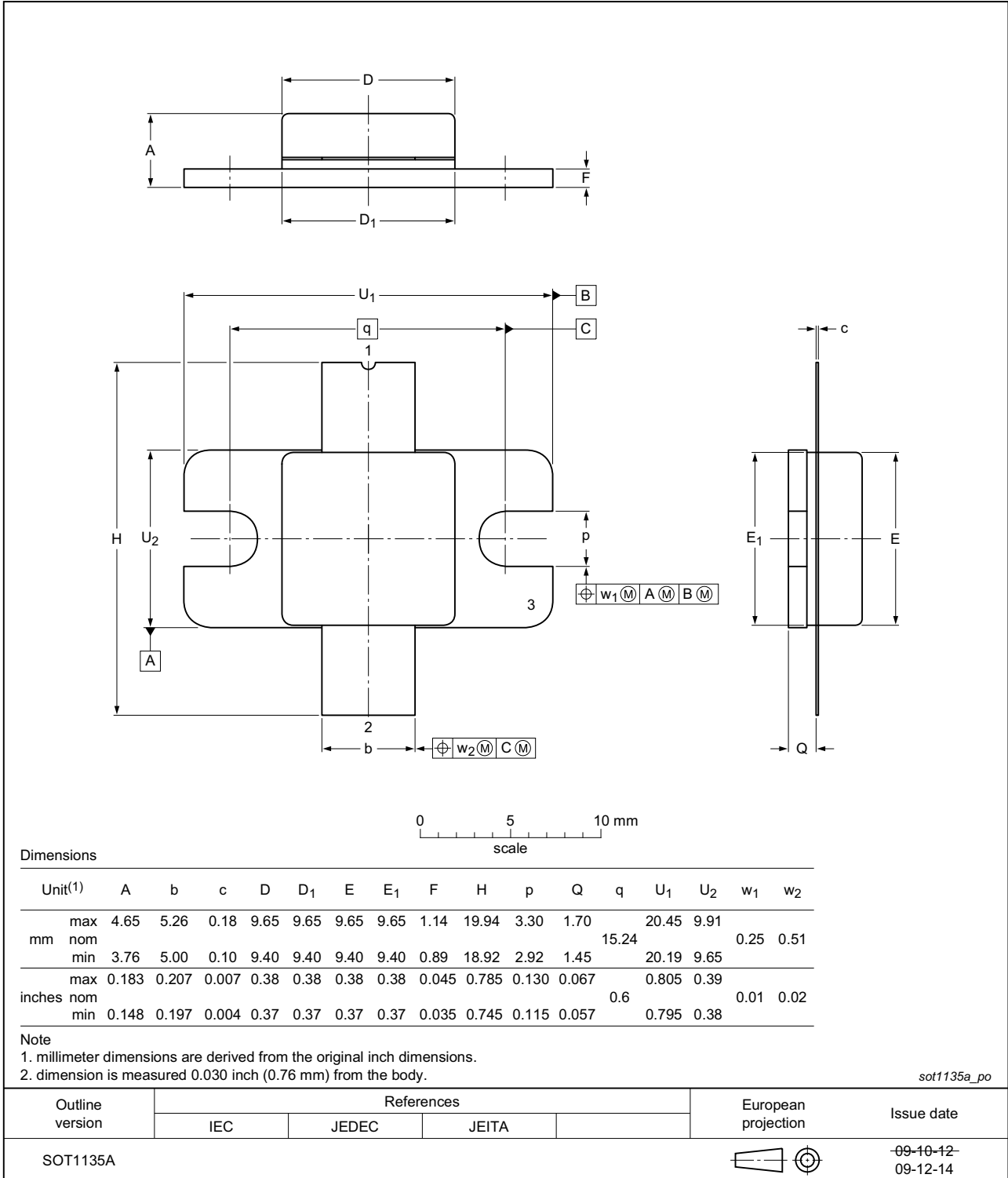
[2] American Technical Ceramics type 100A or capacitor of same quality.

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

**9. Package outline**

Flanged ceramic package; 2 mounting holes; 2 leads

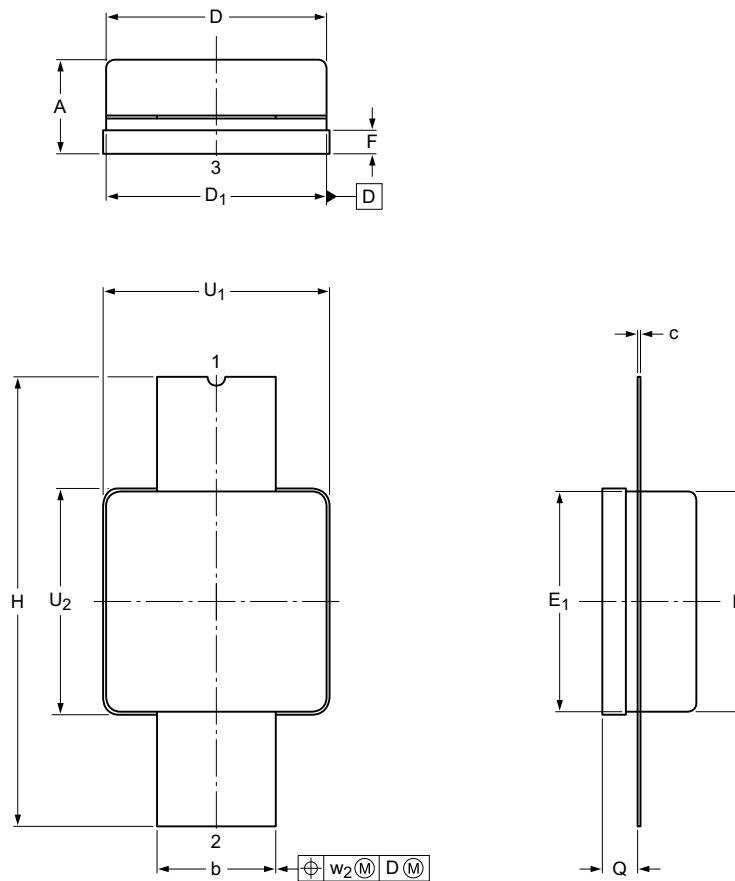
SOT1135A



**Fig 8. Package outline SOT1135A**

Earless flanged ceramic package; 2 leads

SOT1135B



Dimensions

Unit <sup>(1)</sup>	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	F	H	Q	U <sub>1</sub>	U <sub>2</sub>	w <sub>2</sub>
mm	max	4.65	5.26	0.18	9.65	9.65	9.65	1.14	19.94	1.70	9.91	9.91	0.51
	nom												
	min	3.76	5.00	0.10	9.40	9.40	9.40	9.40	0.89	18.92	1.45	9.65	
inches	max	0.183	0.207	0.007	0.38	0.38	0.38	0.045	0.785	0.067	0.39	0.39	0.02
	nom												
	min	0.148	0.197	0.004	0.37	0.37	0.37	0.37	0.035	0.745	0.057	0.38	

Note

1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1135b\_po

Outline version	References			European projection	Issue date
	IEC	JEDEC	JEITA		
SOT1135B					<del>09-10-12</del> 09-12-14

Fig 9. Package outline SOT1135B

## 10. 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.

## 11. Abbreviations

Table 10. Abbreviations

Acronym	Description
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio

## 12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLL8H0514L-130_0514LS-130 v.2	20150209	Product data sheet	-	BLL8H0514L-130_0514LS-130 v.1
Modifications:	<ul style="list-style-type: none"> <li>The status of this document has been changed to Product data sheet.</li> </ul>			
BLL8H0514L-130_0514LS-130 v.1	20140930	Objective data sheet	-	-

## 13. Legal information

### 13.1 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.
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Product [short] data sheet	Production	This document contains the product specification.

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

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