

# BLS6G2735L-30; BLS6G2735LS-30

S-band LDMOS transistor

Rev. 3 — 24 September 2012

Product data sheet

## 1. Product profile

### 1.1 General description

30 W LDMOS power transistor for S-band radar applications in the frequency range from 2.7 GHz to 3.5 GHz.

**Table 1. Application information**

Typical RF performance at  $T_{case} = 25\text{ °C}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ;  $I_{Dq} = 50\text{ mA}$ .

Test signal	f (GHz)	$V_{DS}$ (V)	$P_L$ (W)	$G_p$ (dB)	$\eta_D$ (%)	$t_r$ (ns)	$t_f$ (ns)
<b>Typical RF performance in a class-AB production test circuit in band 3.1 GHz to 3.5 GHz</b>							
pulsed RF	3.1 to 3.5	32	30	13	50	20	10
<b>Typical RF performance in an application circuit in small band 2.7 GHz to 3.3 GHz</b>							
pulsed RF	2.7 to 3.3	32	35	14	50	20	10
<b>Typical RF performance in an application circuit in small band 2.7 GHz to 3.5 GHz</b>							
pulsed RF	2.7 to 3.5	32	30	12	47	20	10

### 1.2 Features and benefits

- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2.7 GHz to 3.5 GHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

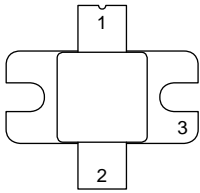
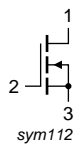
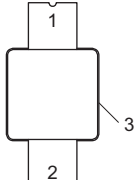
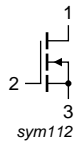
### 1.3 Applications

- S-band radar applications in the frequency range 2.7 GHz to 3.5 GHz



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLS6G2735L-30 (SOT1135A)</b>			
1	drain		 sym112
2	gate		
3	source <a href="#">[1]</a>		
<b>BLS6G2735LS-30 (SOT1135B)</b>			
1	drain		 sym112
2	gate		
3	source <a href="#">[1]</a>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLS6G2735L-30	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT1135A
BLS6G2735LS-30	-	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	Min	Max	Unit
$V_{DS}$	drain-source voltage	-	60	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
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_h = 85\text{ °C}; P_{L(CW)} = 30\text{ W}$		
		$t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.507	K/W
		$t_p = 200\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.662	K/W
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.761	K/W
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ }\%$	0.594	K/W

**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	$V_{DS} = 10\text{ V}; I_D = 40\text{ mA}$	1.4	2	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	8.2	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 8.3\text{ V}; V_{DS} = 0\text{ V}$	-	-	140	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 1.4\text{ A}$	-	2.8	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 1.4\text{ A}$	-	0.37	0.58	$\Omega$

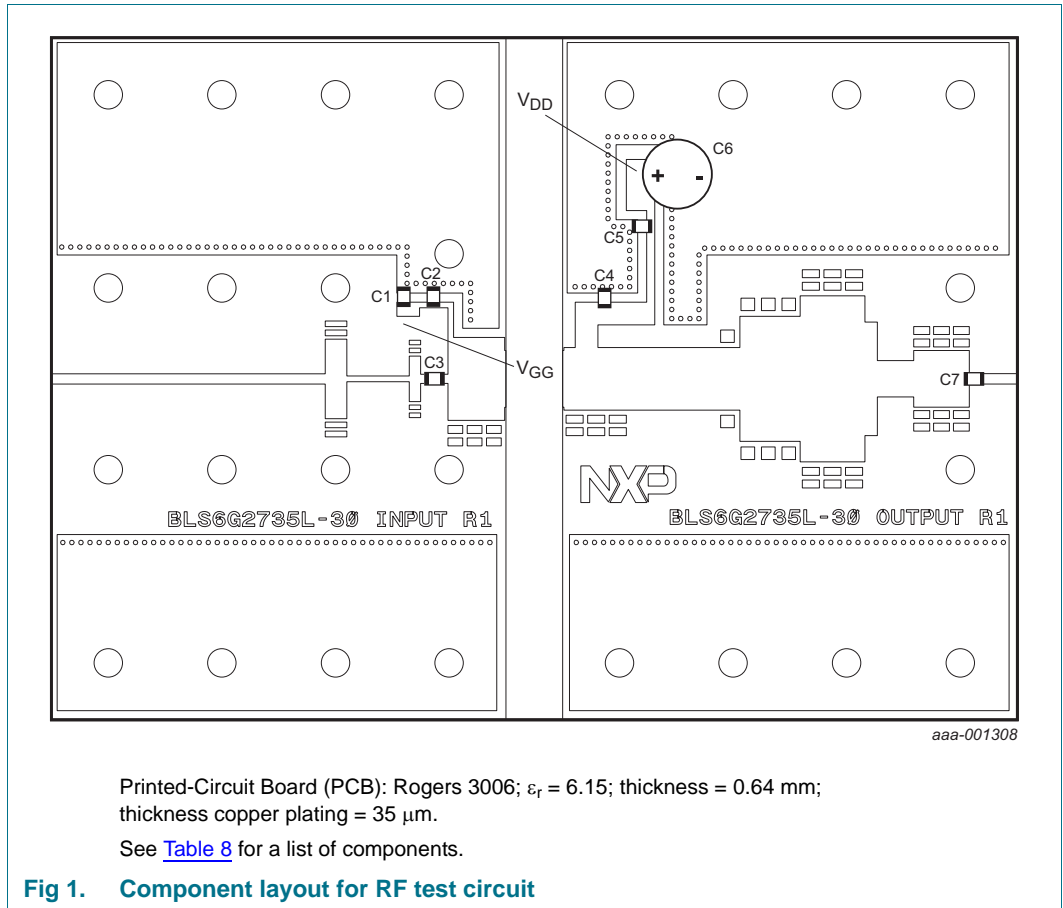
**Table 7. RF characteristics**

Test signal: pulsed RF;  $f_1 = 3100\text{ MHz}; f_2 = 3300\text{ MHz}; f_3 = 3500\text{ MHz}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ ;  $V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}; T_{case} = 25\text{ °C}$ ; unless otherwise specified, in the class-AB RF production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_L$	output power		-	30	-	W
$G_p$	power gain	$P_L = 30\text{ W}$	11	13	-	dB
$\eta_D$	drain efficiency	$P_L = 30\text{ W}$	43	50	-	%
$t_r$	rise time	$P_L = 30\text{ W}$	-	20	50	ns
$t_f$	fall time	$P_L = 30\text{ W}$	-	10	50	ns

**7. Application information**

**7.1 Circuit information for application circuit (2.7 GHz to 3.5 GHz)**



**Table 8. List of components**

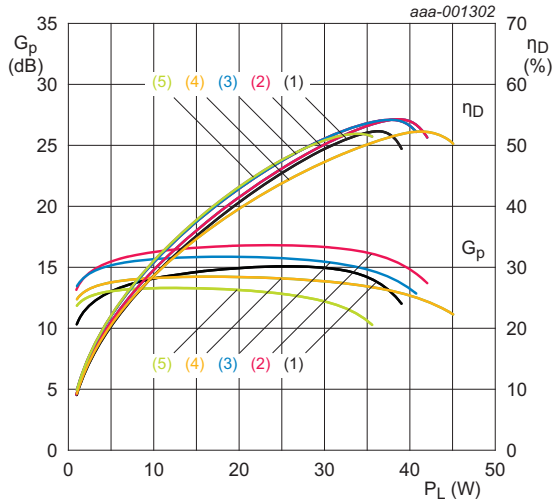
For test circuit see [Figure 1](#).

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	2 $\mu\text{F}$ , 50 V	[1]
C2	multilayer ceramic chip capacitor	100 pF	[2]
C3	multilayer ceramic chip capacitor	0.6 pF	[2]
C4, C7	multilayer ceramic chip capacitor	10 pF	[2]
C5	multilayer ceramic chip capacitor	1 $\mu\text{F}$ , 50 V	[1]
C6	electrolytic capacitor	470 $\mu\text{F}$ , 63 V	

[1] TDK or capacitor of same quality.

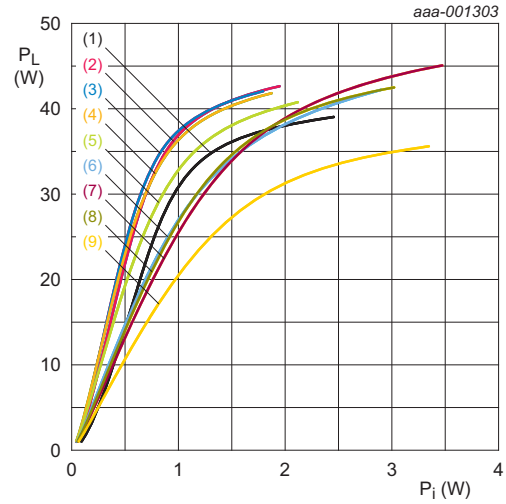
[2] American Technical Ceramics type 800A or capacitor of same quality.

**7.2 Measured in application circuit from 2.7 GHz to 3.5 GHz**



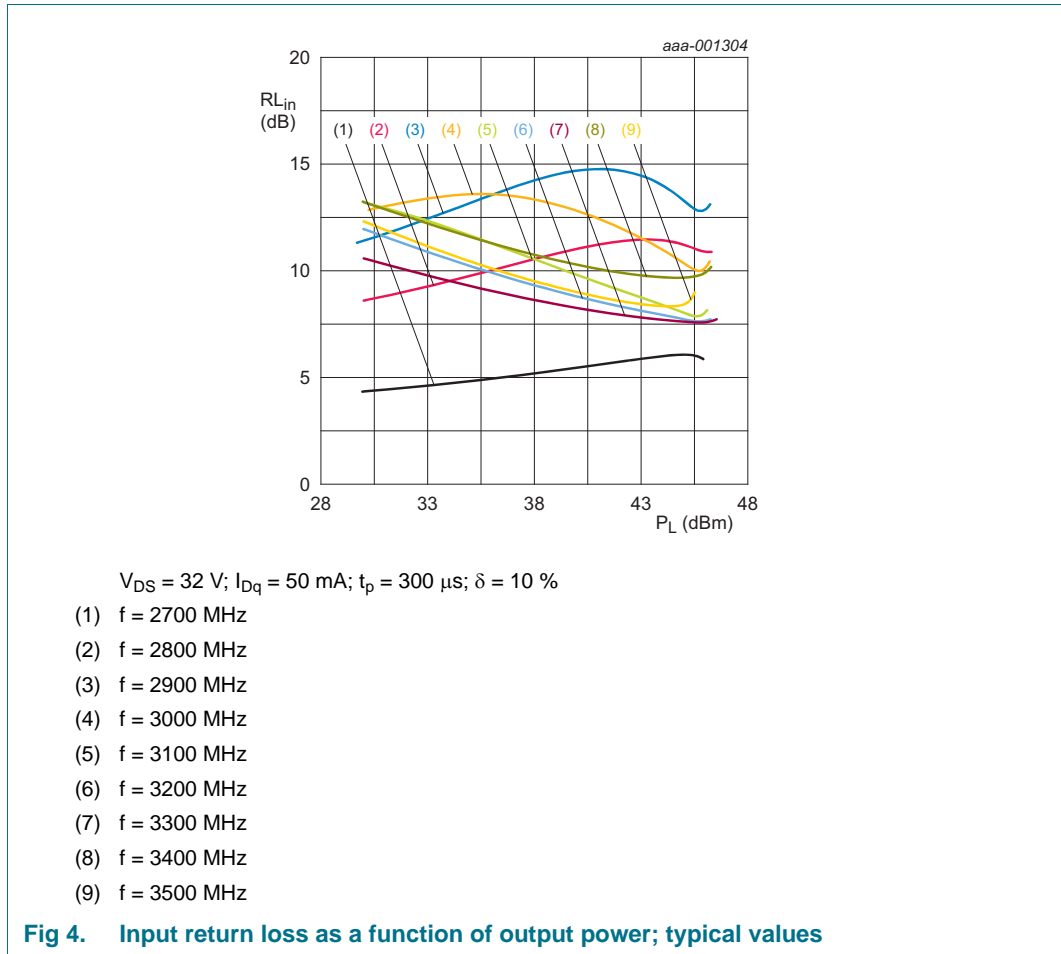
- $V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}; t_p = 300\ \mu\text{s}; \delta = 10\%$
- (1)  $f = 2700\text{ MHz}$
  - (2)  $f = 2900\text{ MHz}$
  - (3)  $f = 3100\text{ MHz}$
  - (4)  $f = 3300\text{ MHz}$
  - (5)  $f = 3500\text{ MHz}$

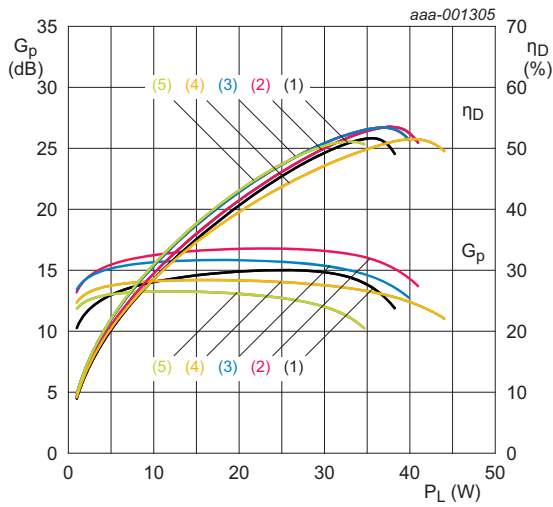
**Fig 2. Power gain and drain efficiency as function of output power; typical values**



- $V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}; t_p = 300\ \mu\text{s}; \delta = 10\%$
- (1)  $f = 2700\text{ MHz}$
  - (2)  $f = 2800\text{ MHz}$
  - (3)  $f = 2900\text{ MHz}$
  - (4)  $f = 3000\text{ MHz}$
  - (5)  $f = 3100\text{ MHz}$
  - (6)  $f = 3200\text{ MHz}$
  - (7)  $f = 3300\text{ MHz}$
  - (8)  $f = 3400\text{ MHz}$
  - (9)  $f = 3500\text{ MHz}$

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

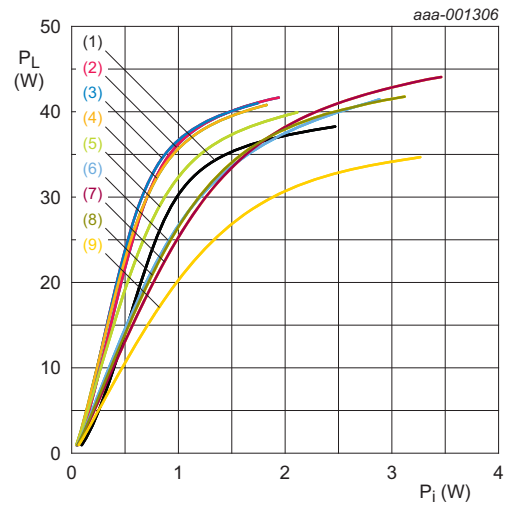




$V_{DS} = 32\text{ V}; I_{DQ} = 50\text{ mA}; t_p = 100\ \mu\text{s}; \delta = 20\%$

- (1)  $f = 2700\text{ MHz}$
- (2)  $f = 2900\text{ MHz}$
- (3)  $f = 3100\text{ MHz}$
- (4)  $f = 3300\text{ MHz}$
- (5)  $f = 3500\text{ MHz}$

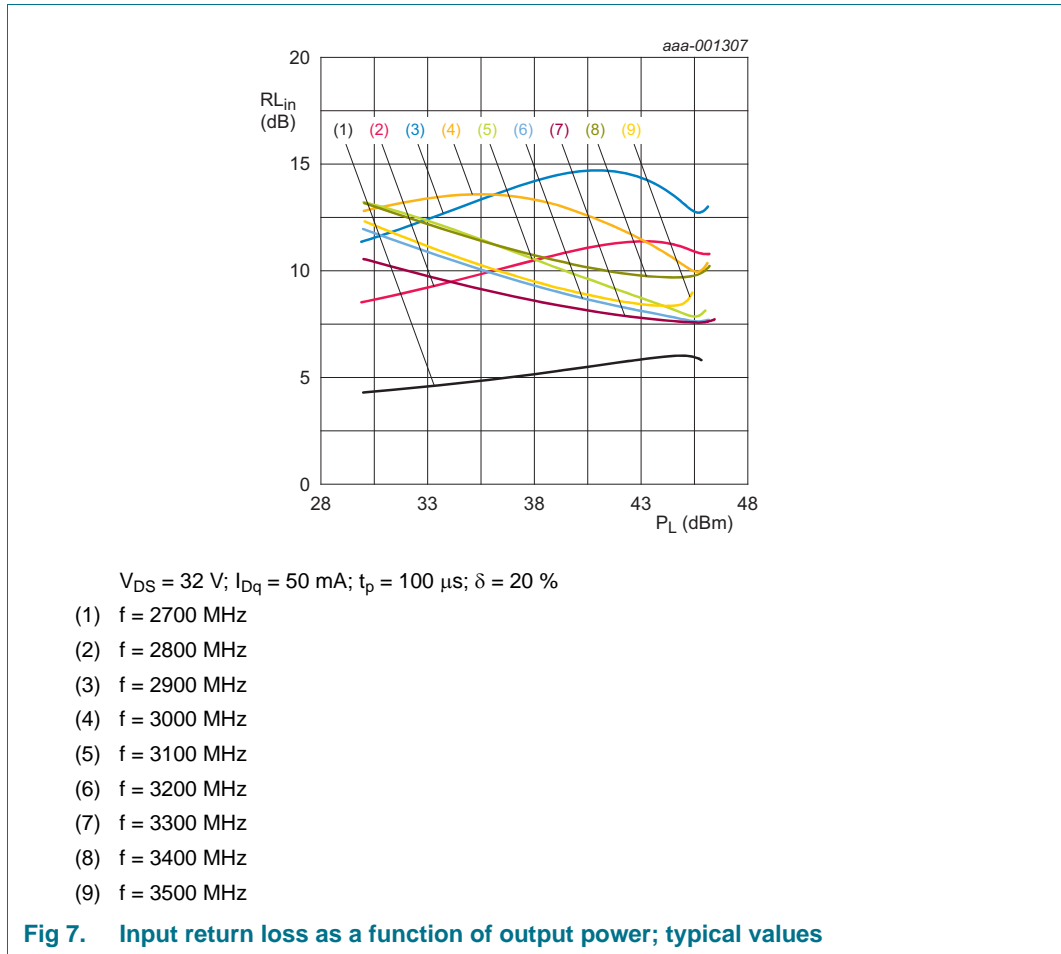
**Fig 5. Power gain and drain efficiency as function of output power; typical values**



$V_{DS} = 32\text{ V}; I_{DQ} = 50\text{ mA}; t_p = 100\ \mu\text{s}; \delta = 20\%$

- (1)  $f = 2700\text{ MHz}$
- (2)  $f = 2800\text{ MHz}$
- (3)  $f = 2900\text{ MHz}$
- (4)  $f = 3000\text{ MHz}$
- (5)  $f = 3100\text{ MHz}$
- (6)  $f = 3200\text{ MHz}$
- (7)  $f = 3300\text{ MHz}$
- (8)  $f = 3400\text{ MHz}$
- (9)  $f = 3500\text{ MHz}$

**Fig 6. Output power as a function of input power; typical values**





## 8. Test information

### 8.1 Ruggedness in class-AB operation

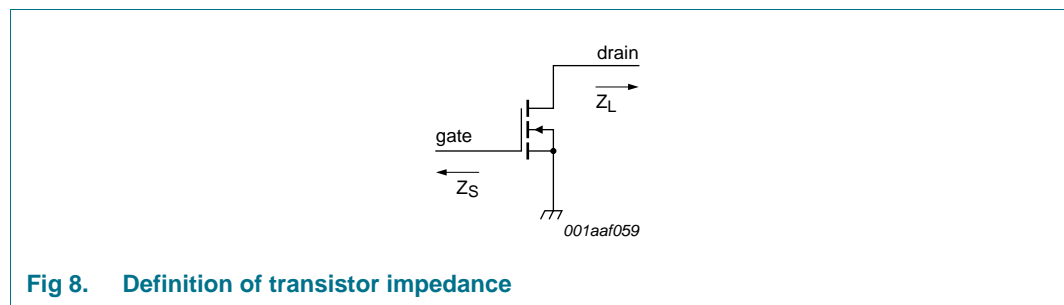
The BLS6G2735L-30 and BLS6G2735LS-30 are capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 32 \text{ V}$ ;  $I_{Dq} = 50 \text{ mA}$ ;  $P_L = 30 \text{ W}$ ;  $t_p = 300 \mu\text{s}$ ;  $\delta = 10 \%$ .

### 8.2 Impedance information

**Table 9. Typical impedance**

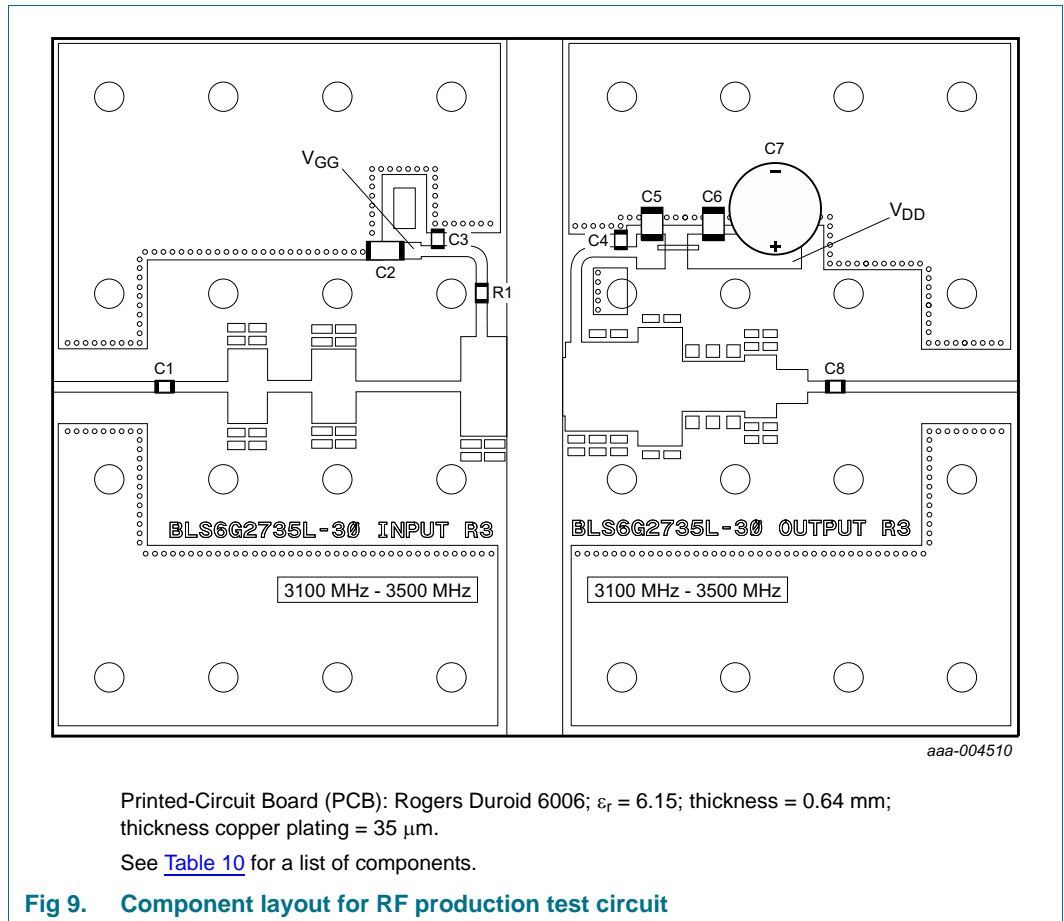
Source and load impedances obtained in a wideband test circuit.

<b>f</b> <b>GHz</b>	<b>Z<sub>S</sub></b> <b>Ω</b>	<b>Z<sub>L</sub></b> <b>Ω</b>
2.7	3.4 – j16.0	32.7 – j3.8
2.9	4.3 – j13.0	20.3 – j4.2
3.1	5.4 – j11.6	18.3 – j3.9
3.3	5.4 – j12.0	15.0 – j7.2
3.5	3.7 – j11.7	8.4 – j6.6



**Fig 8. Definition of transistor impedance**

## 8.3 Circuit information for production test circuit (3.1 GHz to 3.5 GHz)



**Table 10. List of components**

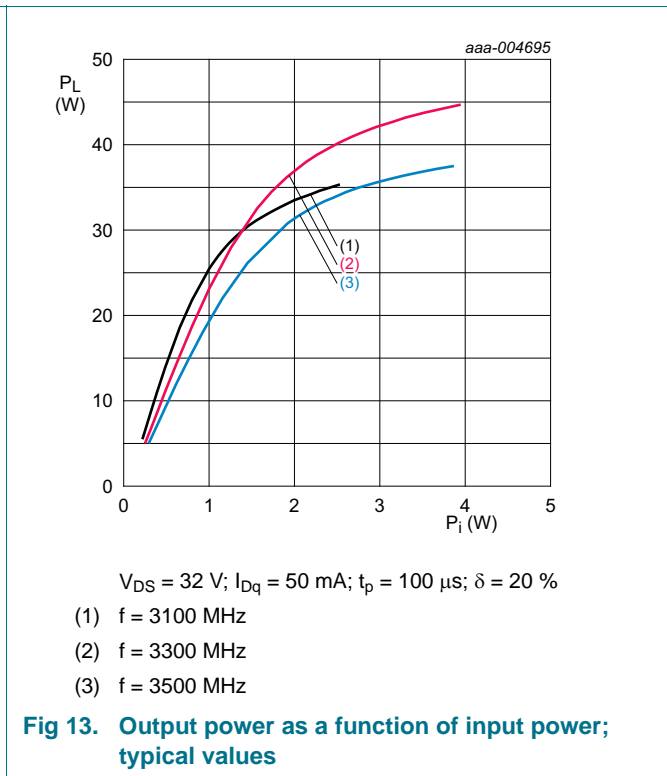
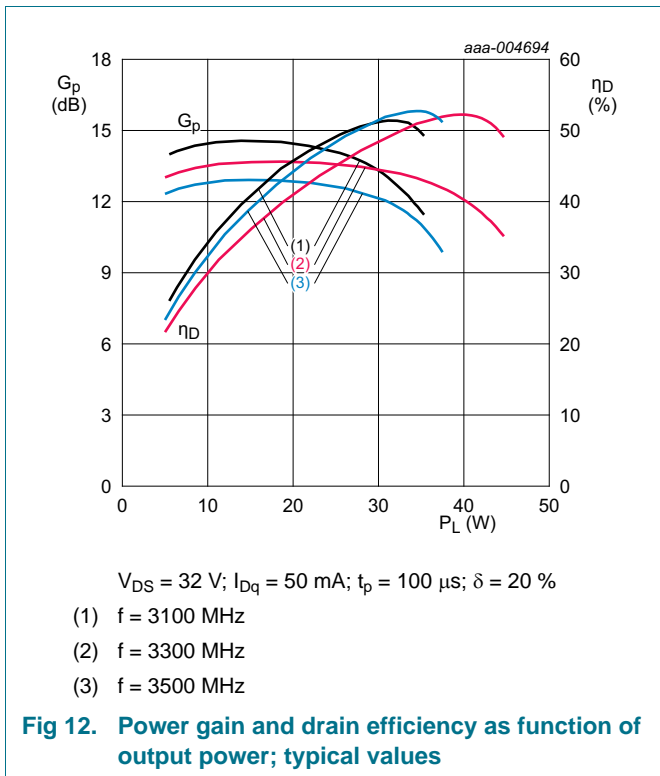
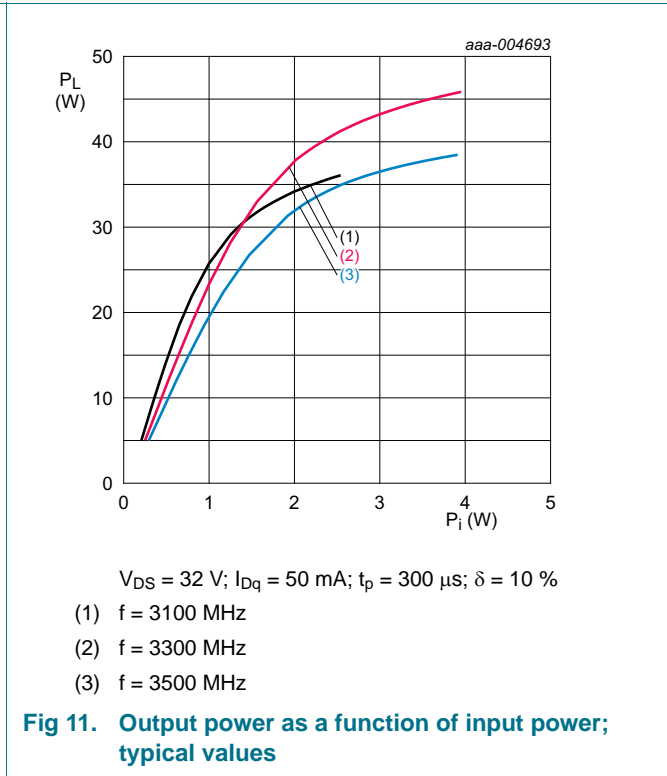
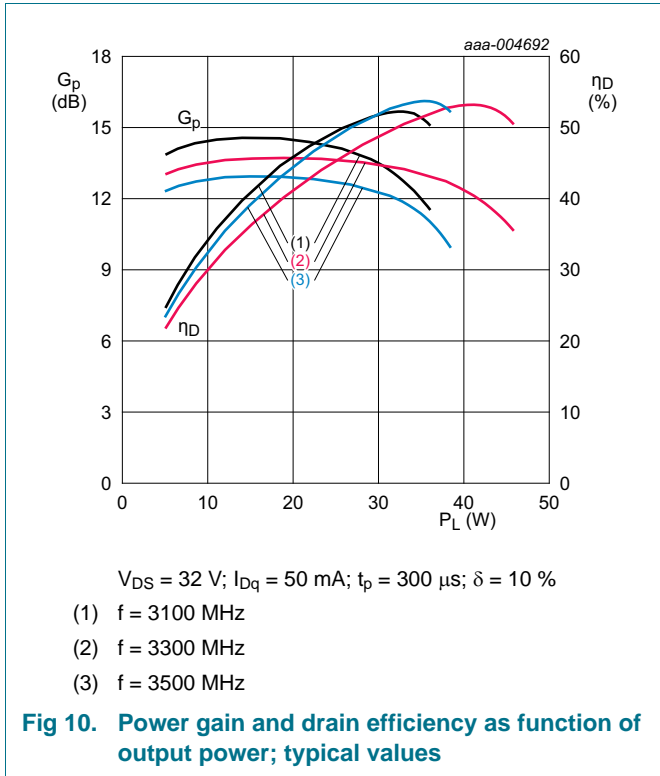
For test circuit see [Figure 9](#).

Component	Description	Value	Remarks
C1, C3, C4, C8	multilayer ceramic chip capacitor	10 pF	[1]
C2	multilayer ceramic chip capacitor	1 $\mu\text{F}$	[2]
C5	multilayer ceramic chip capacitor	4.7 $\mu\text{F}$ , 50 V	[2]
C6	multilayer ceramic chip capacitor	10 $\mu\text{F}$ , 50 V	[2]
C7	electrolytic capacitor	100 $\mu\text{F}$ , 63 V	
R1	SMD resistor	10 $\Omega$	

[1] American Technical Ceramics type 800A or capacitor of same quality.

[2] TDK or capacitor of same quality.

**8.4 Measured in RF production test circuit from 3.1 GHz to 3.5 GHz**



**9. Package outline**

Flanged ceramic package; 2 mounting holes; 2 leads

SOT1135A

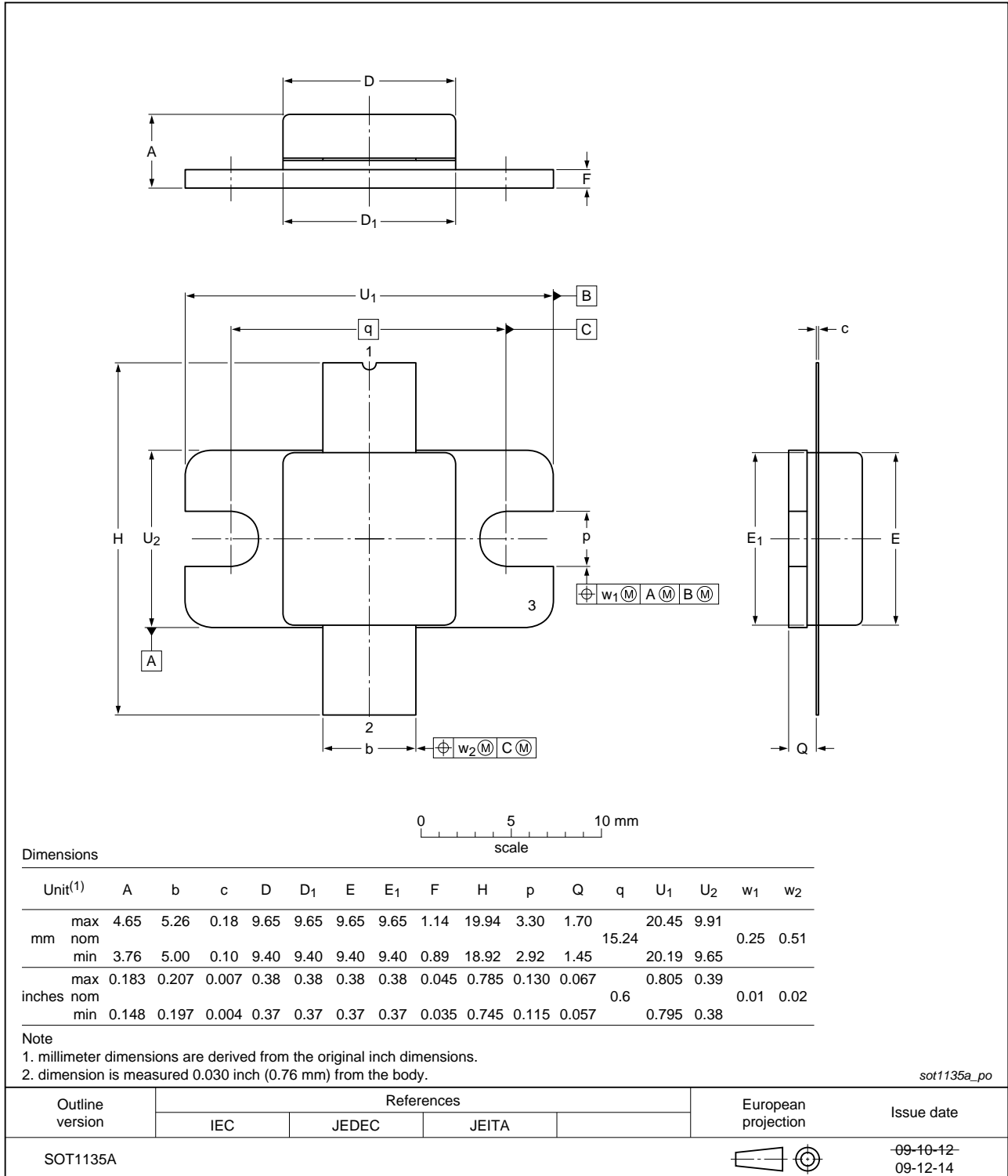
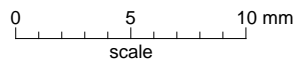
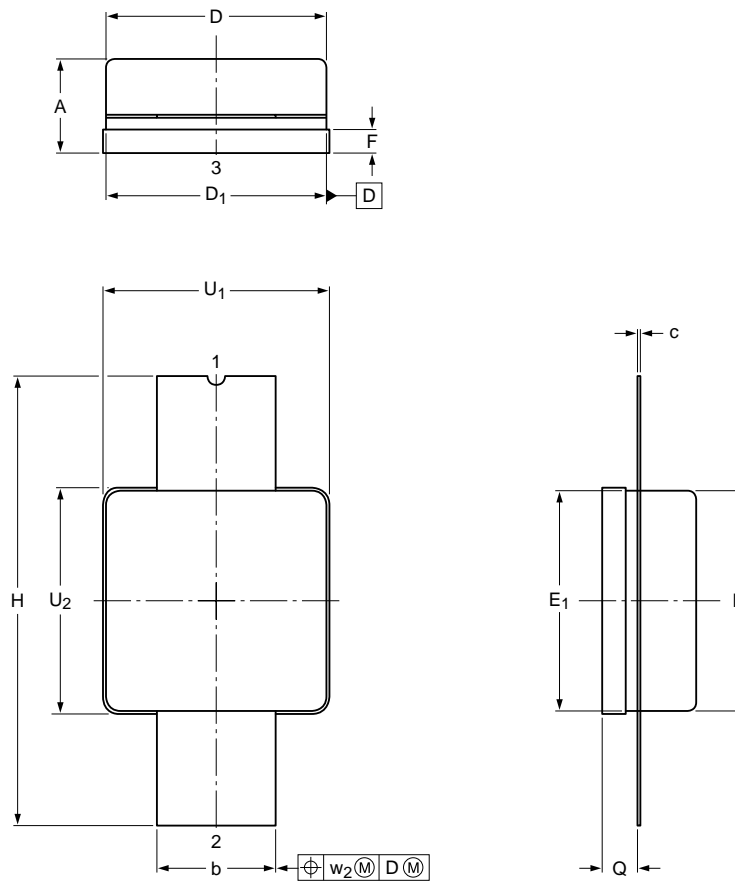


Fig 14. Package outline SOT1135A

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	0.89	18.92	1.45	9.65	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	0.035	0.745	0.057	0.38	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					-09-10-12- 09-12-14

Fig 15. 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 11. Abbreviations

Acronym	Description
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
S-band	Short wave Band
VSWR	Voltage Standing-Wave Ratio

## 12. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLS6G2735L-30_6G2735LS-30 v.3	20120924	Product data sheet	-	BLS6G2735L-30_6G2735LS-30 v.2
Modifications:	<ul style="list-style-type: none"> <li>The status of this document has been changed to Product data sheet</li> </ul>			
BLS6G2735L-30_6G2735LS-30 v.2	20120904	Preliminary data sheet	-	BLS6G2735L-30_6G2735LS-30 v.1
BLS6G2735L-30_6G2735LS-30 v.1	20111011	Objective data sheet	-	-

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

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## 15. 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>3</b>
<b>6</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Application information</b> . . . . .	<b>4</b>
7.1	Circuit information for application circuit (2.7 GHz to 3.5 GHz) . . . . .	4
7.2	Measured in application circuit from 2.7 GHz to 3.5 GHz . . . . .	5
<b>8</b>	<b>Test information</b> . . . . .	<b>9</b>
8.1	Ruggedness in class-AB operation . . . . .	9
8.2	Impedance information . . . . .	9
8.3	Circuit information for production test circuit (3.1 GHz to 3.5 GHz) . . . . .	10
8.4	Measured in RF production test circuit from 3.1 GHz to 3.5 GHz . . . . .	11
<b>9</b>	<b>Package outline</b> . . . . .	<b>12</b>
<b>10</b>	<b>Handling information</b> . . . . .	<b>14</b>
<b>11</b>	<b>Abbreviations</b> . . . . .	<b>14</b>
<b>12</b>	<b>Revision history</b> . . . . .	<b>14</b>
<b>13</b>	<b>Legal information</b> . . . . .	<b>15</b>
13.1	Data sheet status . . . . .	15
13.2	Definitions . . . . .	15
13.3	Disclaimers . . . . .	15
13.4	Trademarks . . . . .	16
<b>14</b>	<b>Contact information</b> . . . . .	<b>16</b>
<b>15</b>	<b>Contents</b> . . . . .	<b>17</b>

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