

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 $T_{case} = 25\text{ }^{\circ}\text{C}$; $t_p = 300\text{ }\mu\text{s}$; $\delta = 10\text{ }\%$; $I_{Dq} = 50\text{ mA}$.

Test signal	f (GHz)	V _{DS} (V)	P _L (W)	G _p (dB)	η_D (%)	t _r (ns)	t _f (ns)
Typical RF performance in a class-AB production test circuit in band 3.1 GHz to 3.5 GHz							
pulsed RF	3.1 to 3.5	32	30	13	50	20	10
Typical RF performance in an application circuit in small band 2.7 GHz to 3.3 GHz							
pulsed RF	2.7 to 3.3	32	35	14	50	20	10
Typical RF performance in an application circuit in small band 2.7 GHz to 3.5 GHz							
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)

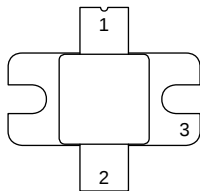
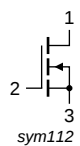
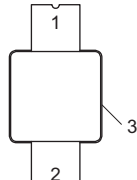
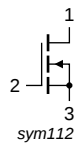
1.3 Applications

- 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
BLS6G2735L-30 (SOT1135A)			
1	drain		
2	gate		
3	source		
BLS6G2735LS-30 (SOT1135B)			
1	drain		
2	gate		
3	source		

[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	μA
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	Ω

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
η_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)

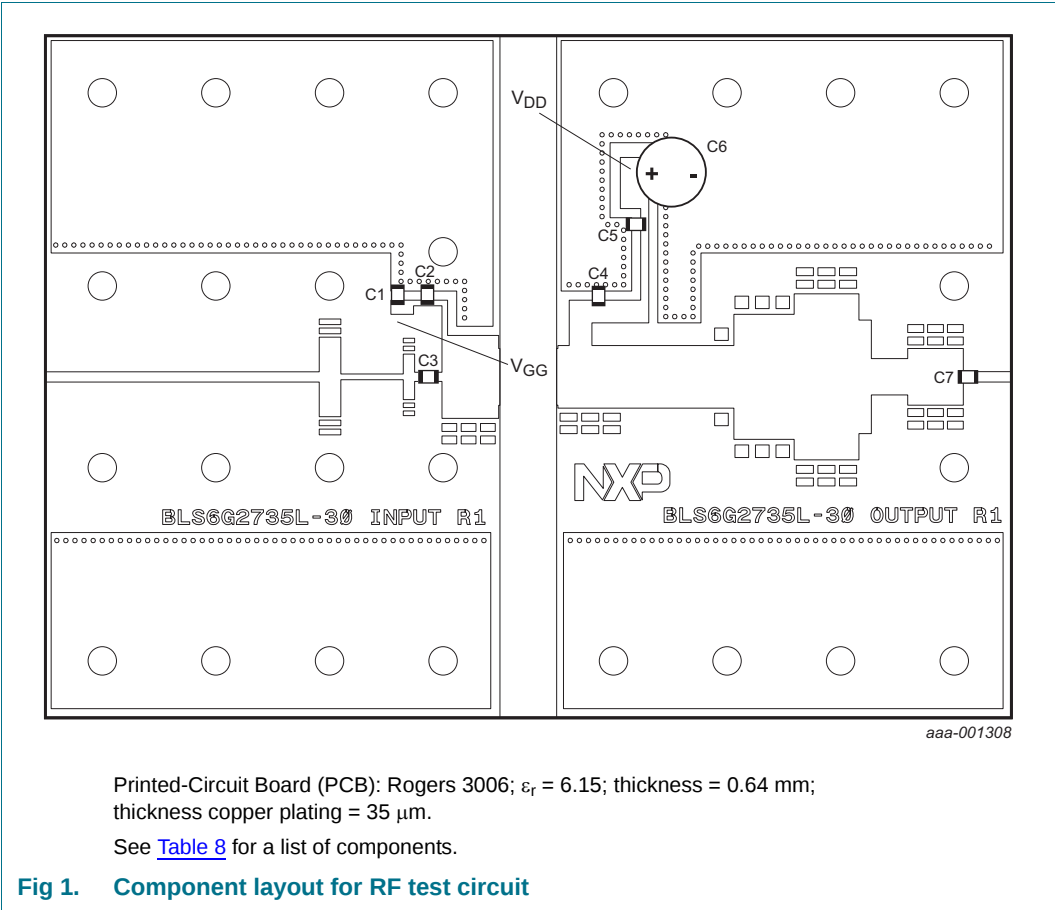


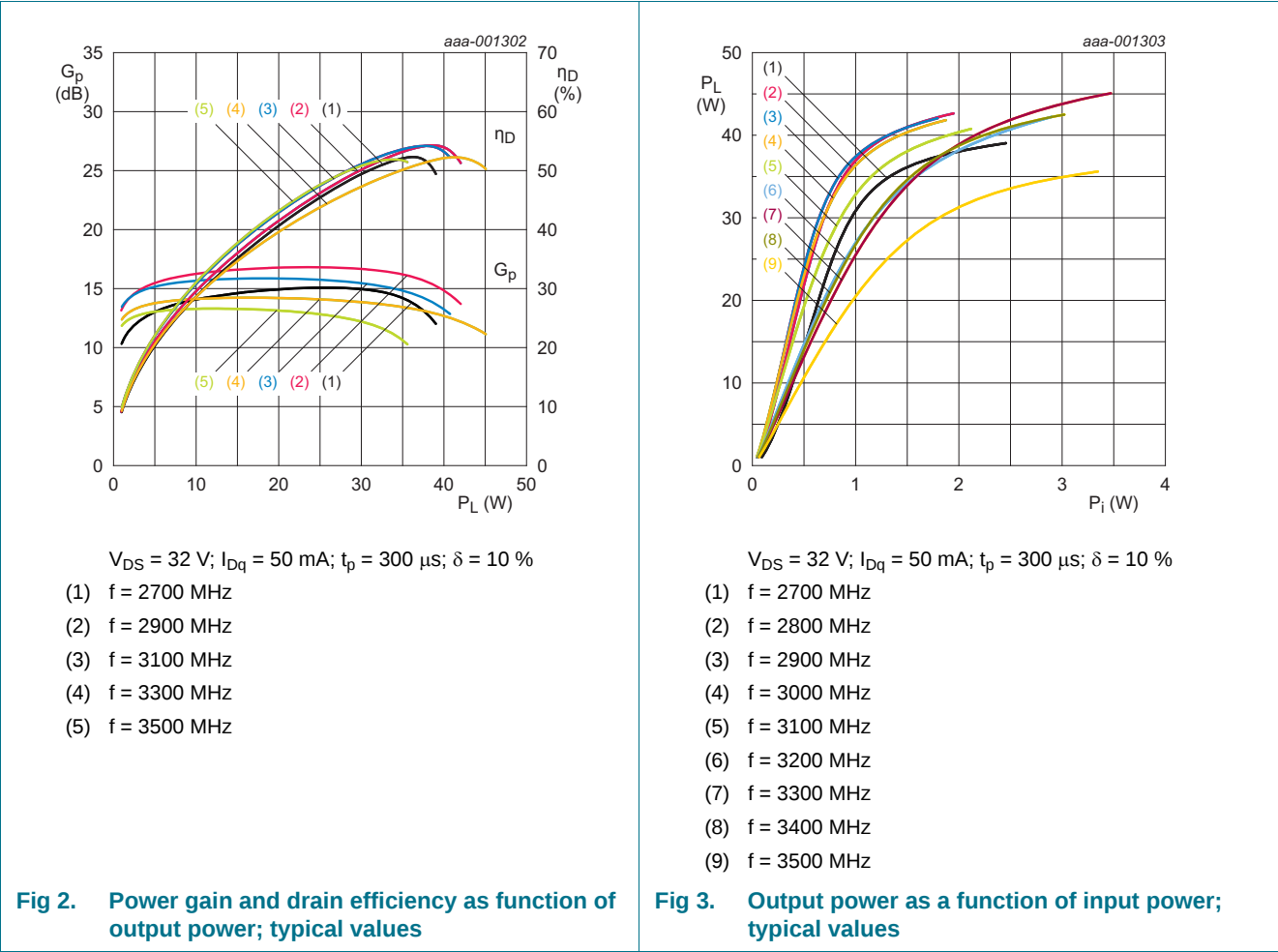
Table 8. List of components

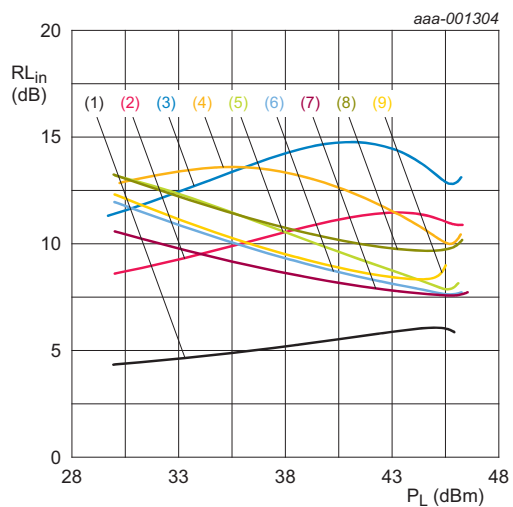
For test circuit see [Figure 1](#).

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	2 μF , 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 μF , 50 V	[1]
C6	electrolytic capacitor	470 μF , 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

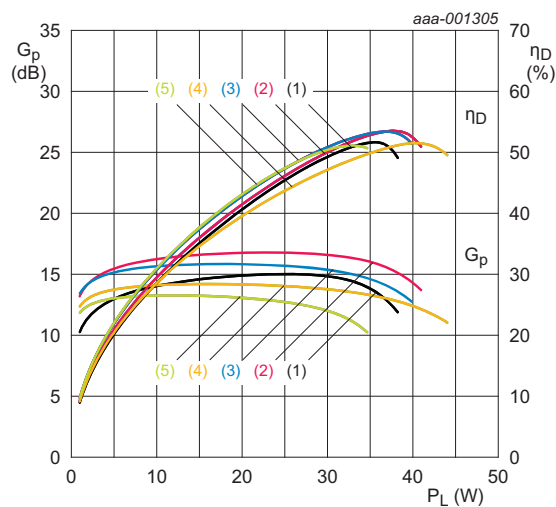




$V_{DS} = 32 \text{ V}$; $I_{DQ} = 50 \text{ mA}$; $t_p = 300 \text{ } \mu\text{s}$; $\delta = 10 \%$

- (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) $f = 3500 \text{ MHz}$

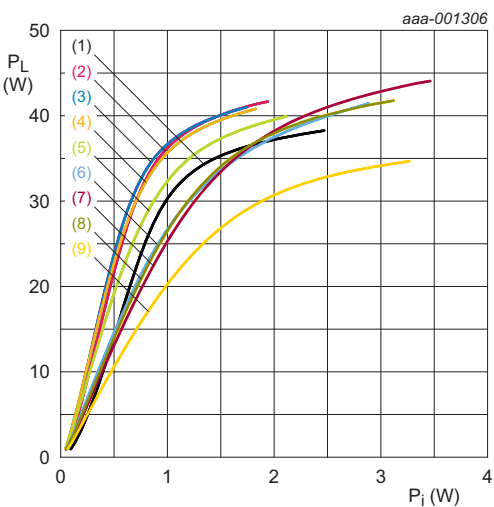
Fig 4. Input return loss as a function of output power; typical values



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

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

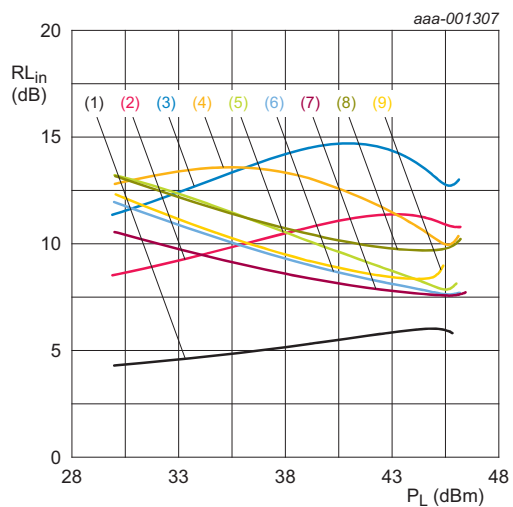
Fig 5. Power gain and drain efficiency as function of output power; typical values



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

- (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



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

- (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 7. Input return loss as a function of output 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 VSWR = 10 : 1 through all phases under the following conditions:
 $V_{DS} = 32\text{ V}$; $I_{Dq} = 50\text{ mA}$; $P_L = 30\text{ W}$; $t_p = 300\text{ }\mu\text{s}$; $\delta = 10\text{ }\%$.

8.2 Impedance information

Table 9. Typical impedance
Source and load impedances obtained in a wideband test circuit.

f GHz	Z_S Ω	Z_L Ω
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	$3.7 - j11.7$	$8.4 - j6.6$

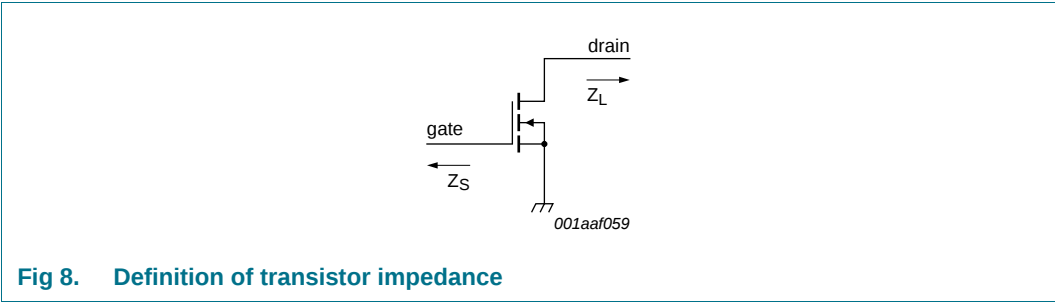


Fig 8. Definition of transistor impedance

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

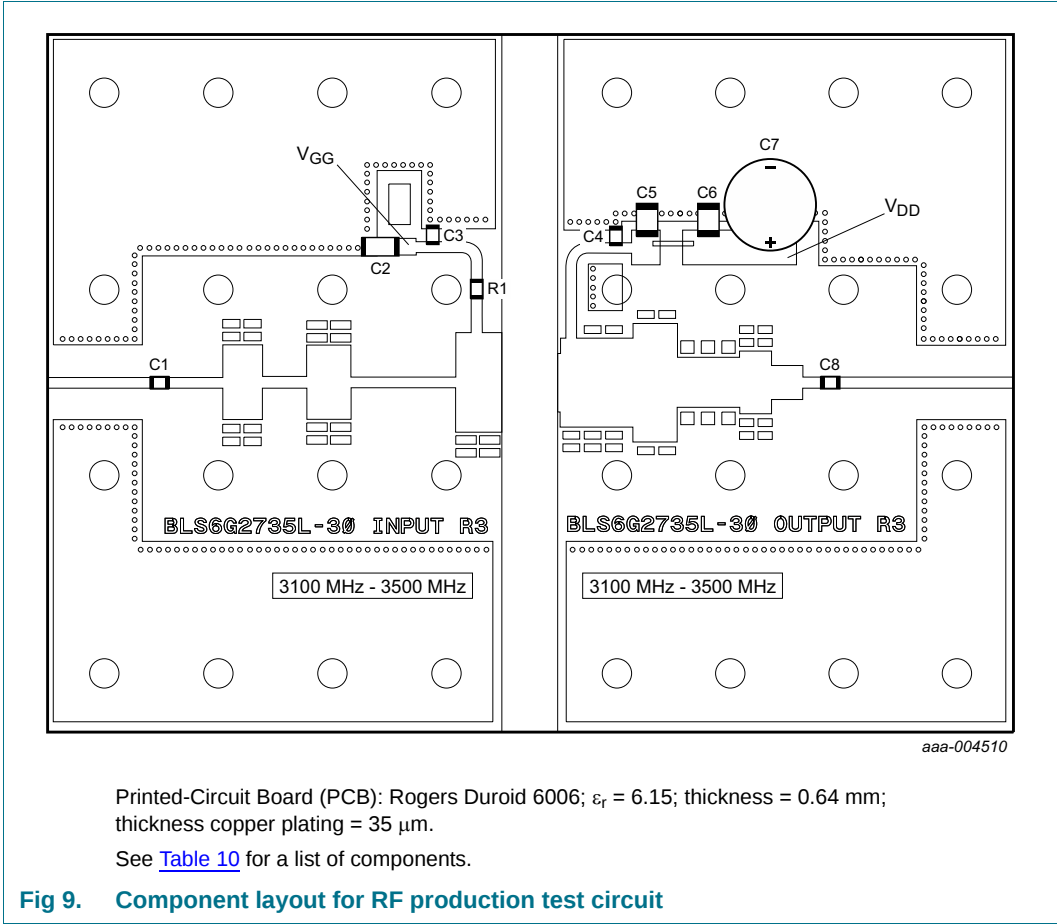


Table 10. List of components

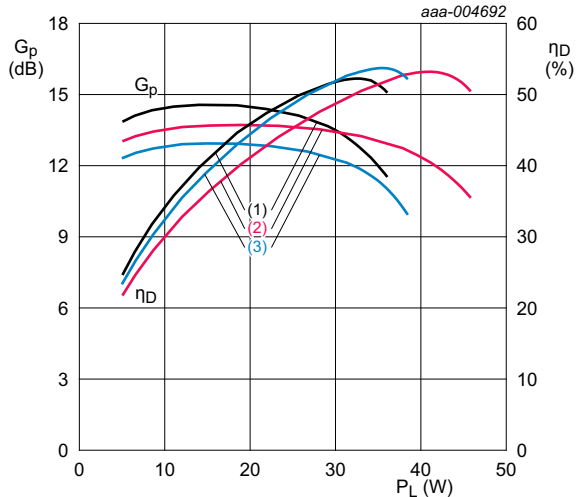
For test circuit see [Figure 9](#).

Component	Description	Value	Remarks
C1, C3, C4, C8	multilayer ceramic chip capacitor	10 pF	[1]
C2	multilayer ceramic chip capacitor	1 μF	[2]
C5	multilayer ceramic chip capacitor	4.7 μF , 50 V	[2]
C6	multilayer ceramic chip capacitor	10 μF , 50 V	[2]
C7	electrolytic capacitor	100 μF , 63 V	
R1	SMD resistor	10 Ω	

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

[2] TDK or capacitor of same quality.

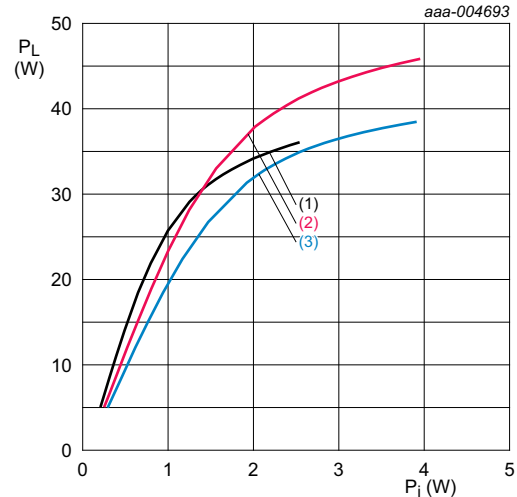
8.4 Measured in RF production test circuit from 3.1 GHz to 3.5 GHz



$V_{DS} = 32 \text{ V}$; $I_{DQ} = 50 \text{ mA}$; $t_p = 300 \text{ } \mu\text{s}$; $\delta = 10 \text{ } \%$

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

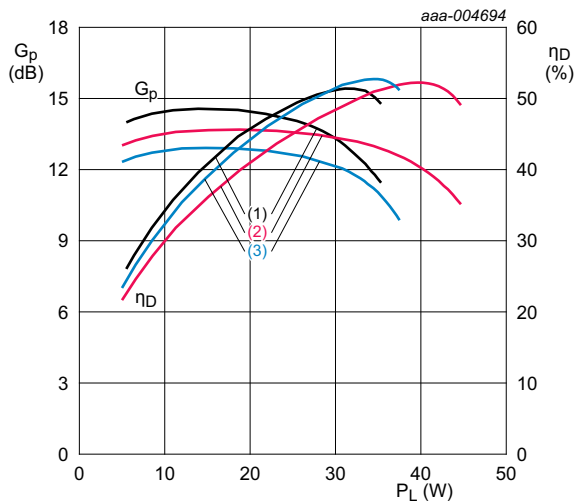
Fig 10. Power gain and drain efficiency as function of output power; typical values



$V_{DS} = 32 \text{ V}$; $I_{DQ} = 50 \text{ mA}$; $t_p = 300 \text{ } \mu\text{s}$; $\delta = 10 \text{ } \%$

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

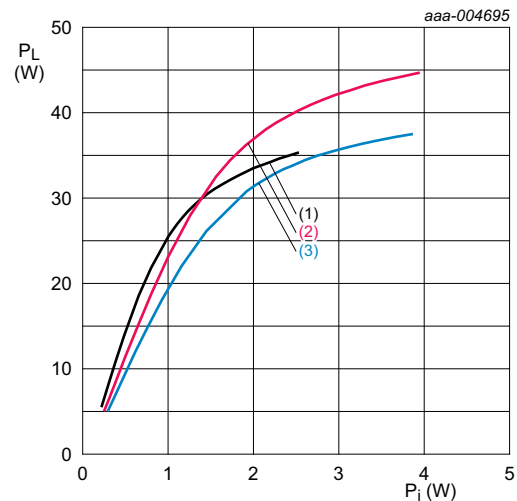
Fig 11. Output power as a function of input power; typical values



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

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

Fig 12. Power gain and drain efficiency as function of output power; typical values



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

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

Fig 13. Output power as a function of input power; typical values

9. Package outline

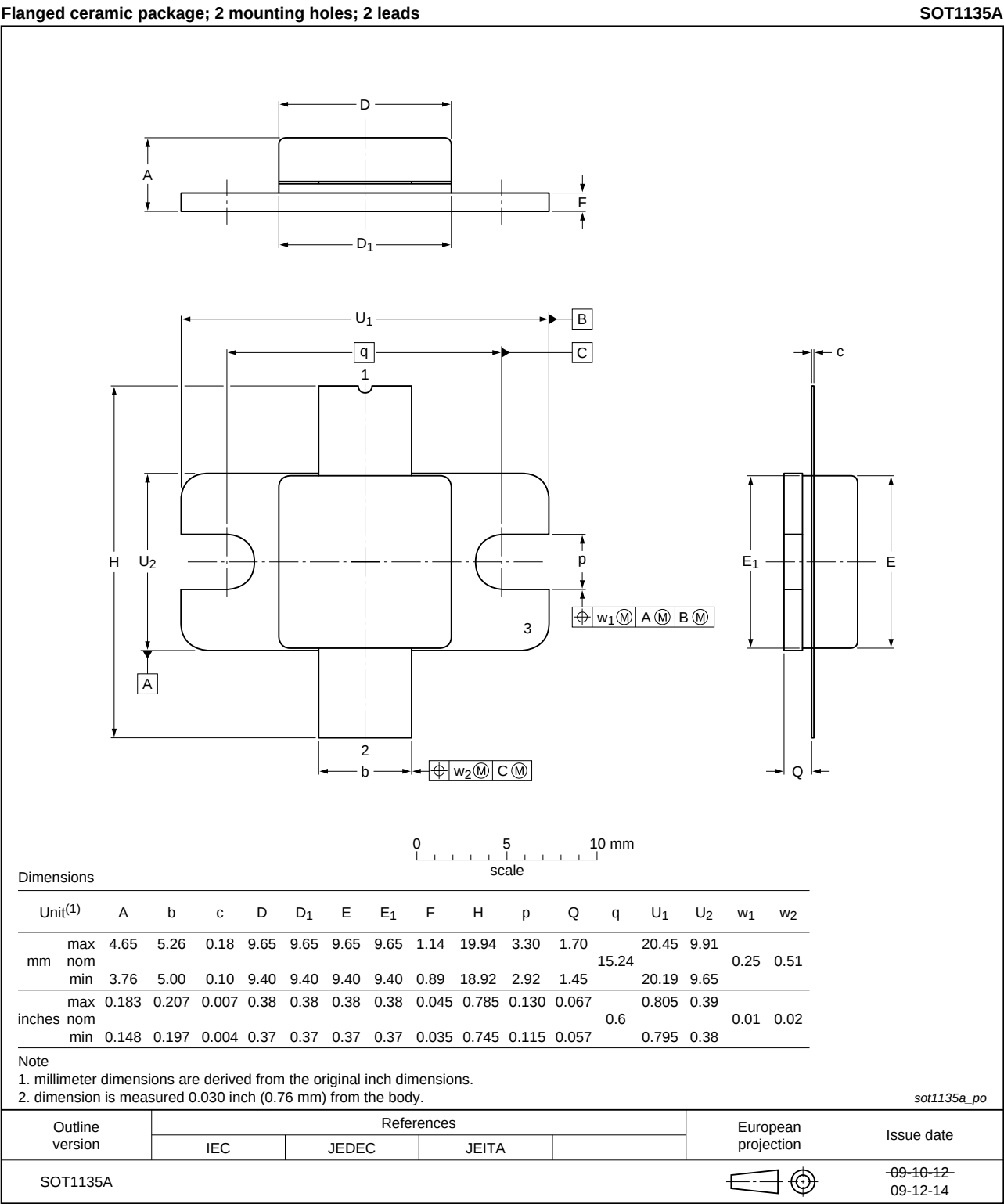


Fig 14. Package outline SOT1135A

Earless flanged ceramic package; 2 leads

SOT1135B

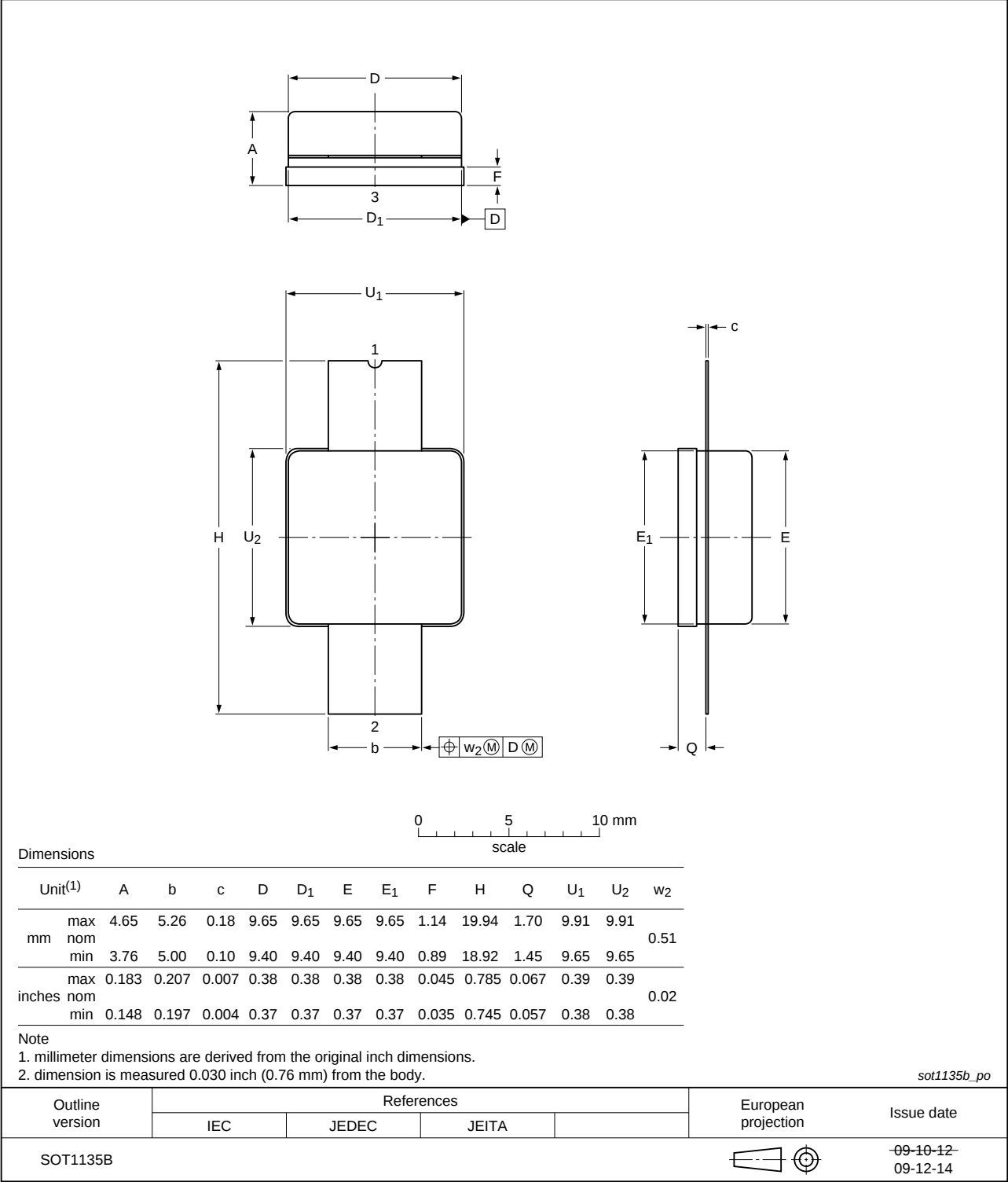


Fig 15. Package outline SOT1135B

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:	• The status of this document has been changed to Product data sheet			
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	-	-

13. Legal information

13.1 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.
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