BLS9G2735L-50; BLS9G2735LS-50

LDMOS S-band radar power transistor

AMPLEON

Rev. 1 — 6 October 2017

Product data sheet

1. Product profile

1.1 General description

Single ended 50 W LDMOS power transistor for S-band radar applications in the frequency range from 2.7 GHz to 3.5 GHz.

Table 1. Typical performance

Typical RF performance at T_{case} = 25 °C; t_p = 300 µs; δ = 10 %; I_{Dq} = 100 mA; in a class-AB demo test circuit.

Test signal	f	V_{DS}	$P_{L(1dB)}$	G_p	η_D
	(GHz)	(V)	(W)	(dB)	(%)
pulsed RF	2.7 to 3.5	32	45	12	48

1.2 Features and benefits

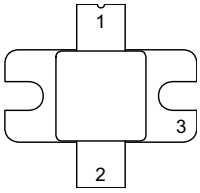
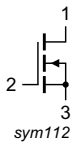
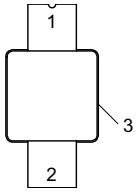
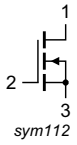
- Single ended
- Small size
- High efficiency
- Excellent ruggedness
- Designed for S-band operation
- Excellent thermal stability
- Easy power control
- Integrated dual sided ESD protection enables excellent off-state isolation
- High flexibility with respect to pulse formats
- Internally matched for 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 from 2.7 GHz to 3.5 GHz

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BLS9G2735L-50 (SOT1135A)			
1	drain		
2	gate		
3	source [1]		
BLS9G2735LS-50 (SOT1135B)			
1	drain		
2	gate		
3	source [1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLS9G2735L-50	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT1135A
BLS9G2735LS-50	-	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	-	65	V
V_{GS}	gate-source voltage	–6	+11	V
T_{stg}	storage temperature	–65	+150	°C
T_j	junction temperature [1]	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability. For details refer to the online MTF calculator.

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5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j\text{-}case)}$	transient thermal impedance from junction to case	T_{case} = 85 °C; P_L = 50 W		
		t_p = 100 μs; δ = 10 %	0.315	K/W
		t_p = 200 μs; δ = 10 %	0.375	K/W
		t_p = 300 μs; δ = 10 %	0.415	K/W
		t_p = 100 μs; δ = 20 %	0.375	K/W
		t_p = 500 μs; δ = 10 %	0.470	K/W
		t_p = 1 ms; δ = 10 %	0.550	K/W

6. Characteristics

Table 6. DC characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.392 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 39.2 mA	1.5	1.9	2.5	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 32 V	-	-	1.4	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	6.4	8.1	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	140	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 39.2 mA	-	360	-	mS
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 1.372 A	-	0.3	-	Ω

Table 7. RF characteristics

Test signal: pulsed RF; 2.9 GHz ≤ f ≤ 3.4 GHz; t_p = 300 μs; δ = 10 %; RF performance at V_{DS} = 32 V; I_{Dq} = 100 mA; T_{case} = 25 °C; unless otherwise specified, in a class-AB wide band production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	P_L = 50 W	10.3	12	-	dB
η_D	drain efficiency	P_L = 50 W	43	48	-	%
RL_{in}	input return loss	P_L = 50 W	-	−8	-	dB
$P_{droop(pulse)}$	pulse droop power	P_L = 50 W	-	0	0.5	dB
t_r	rise time	P_L = 50 W	-	5	50	ns
t_f	fall time	P_L = 50 W	-	5	50	ns
$P_{L(2dB)}$	output power at 2 dB gain compression		50	-	-	W

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7. Test information

7.1 Ruggedness in class-AB operation

The BLS9G2735L-50 and BLS9G2735LS-50 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 32 V; I_{Dq} = 100 mA; P_L = 50 W; t_p = 300 μs; δ = 10 %.

7.2 Impedance information

Table 8. Typical impedance

f	Z_S [1]	Z_L [1]
(GHz)	(Ω)	(Ω)
2.9	4.8 – j14.3	5.9 – j8.9
3.0	7.1 – j17.8	6.5 – j9.3
3.1	9.45 – j19.1	8.5 – j7.9
3.2	11.0 – j20.1	7.9 – j6.9
3.3	21.9 – j20.2	7.3 – j6.1
3.4	37.2 – j3.3	4.6 – j4.9

[1] Impedances are taken at a single halve of the push-pull transistor

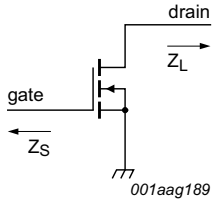
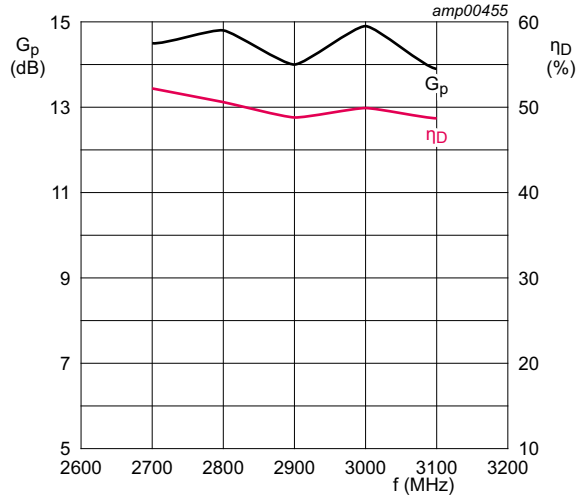


Fig 1. Definition of transistor impedance

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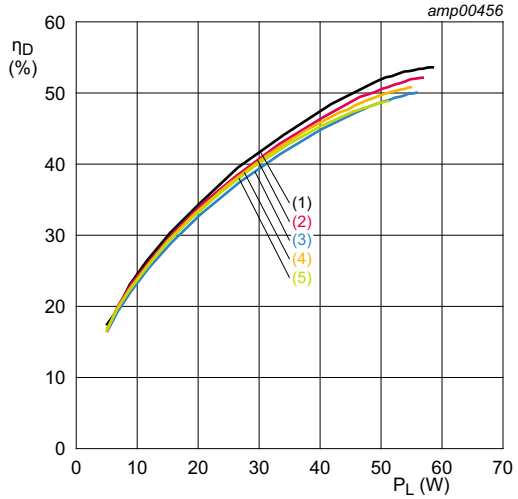
7.3 Graphical data

7.3.1 Frequency range from 2.7 GHz to 3.1 GHz



V_{DS} = 32 V; I_{Dq} = 100 mA; P_L = 50 W; t_p = 300 μs; δ = 10 %.

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

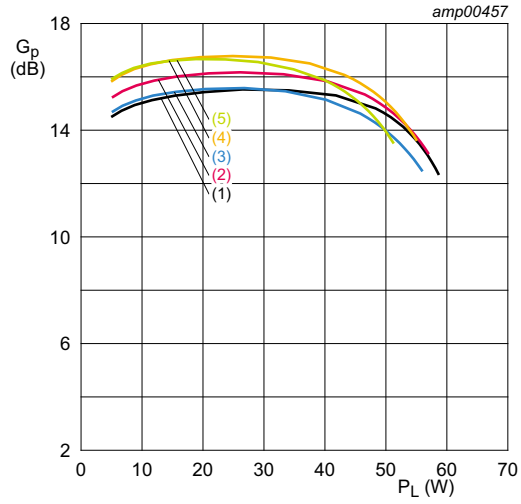


V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

(1) f = 2.7 GHz
(2) f = 2.8 GHz
(3) f = 2.9 GHz
(4) f = 3.0 GHz
(5) f = 3.1 GHz

Fig 3. Drain efficiency as a function of output power; typical values

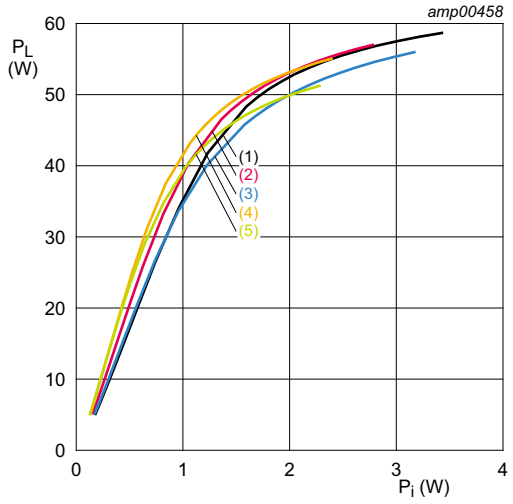
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V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

(1) f = 2.7 GHz
(2) f = 2.8 GHz
(3) f = 2.9 GHz
(4) f = 3.0 GHz
(5) f = 3.1 GHz

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



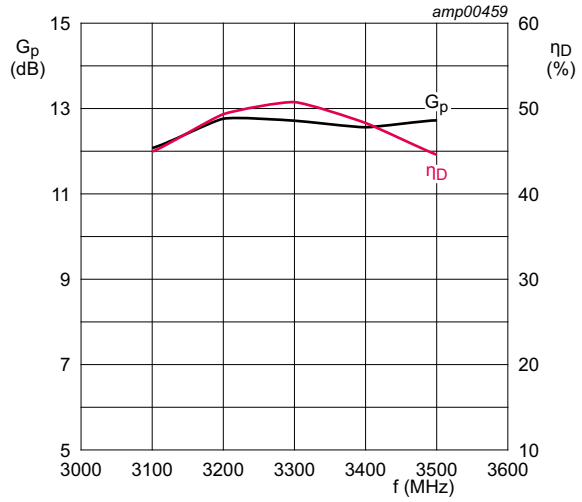
V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

(1) f = 2.7 GHz
(2) f = 2.8 GHz
(3) f = 2.9 GHz
(4) f = 3.0 GHz
(5) f = 3.1 GHz

Fig 5. Output power as a function of input power; typical values

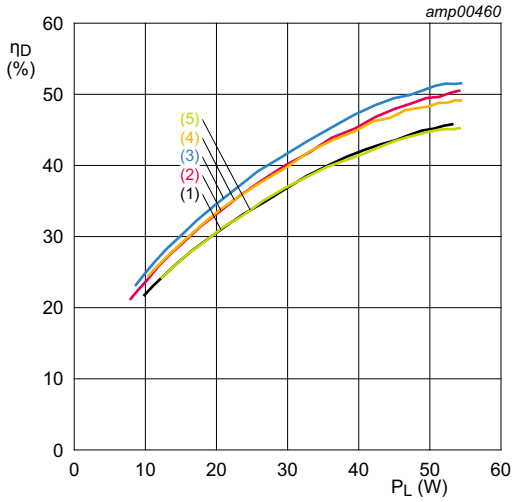
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7.3.2 Frequency range from 3.1 GHz to 3.5 GHz



V_{DS} = 32 V; I_{Dq} = 100 mA; P_L = 50 W; t_p = 300 μs; δ = 10 %.

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

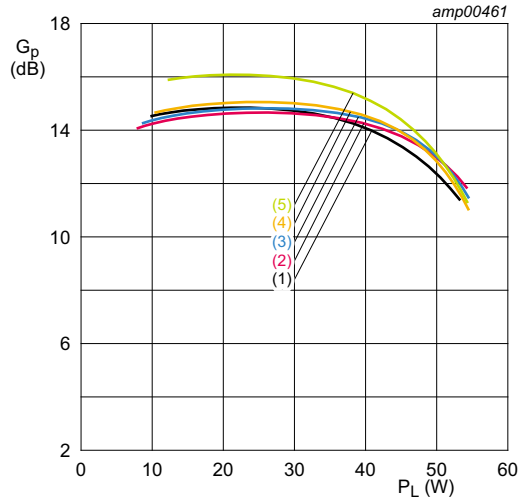


V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

(1) f = 3.1 GHz
(2) f = 3.2 GHz
(3) f = 3.3 GHz
(4) f = 3.4 GHz
(5) f = 3.5 GHz

Fig 7. Drain efficiency as a function of output power; typical values

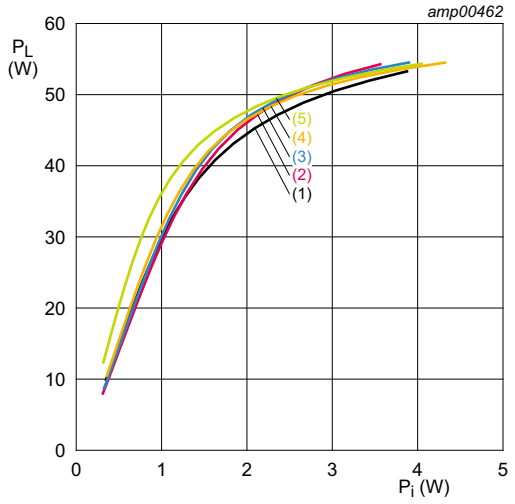
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V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

(1) f = 3.1 GHz
(2) f = 3.2 GHz
(3) f = 3.3 GHz
(4) f = 3.4 GHz
(5) f = 3.5 GHz

Fig 8. Power gain as a function of output power; typical values



V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

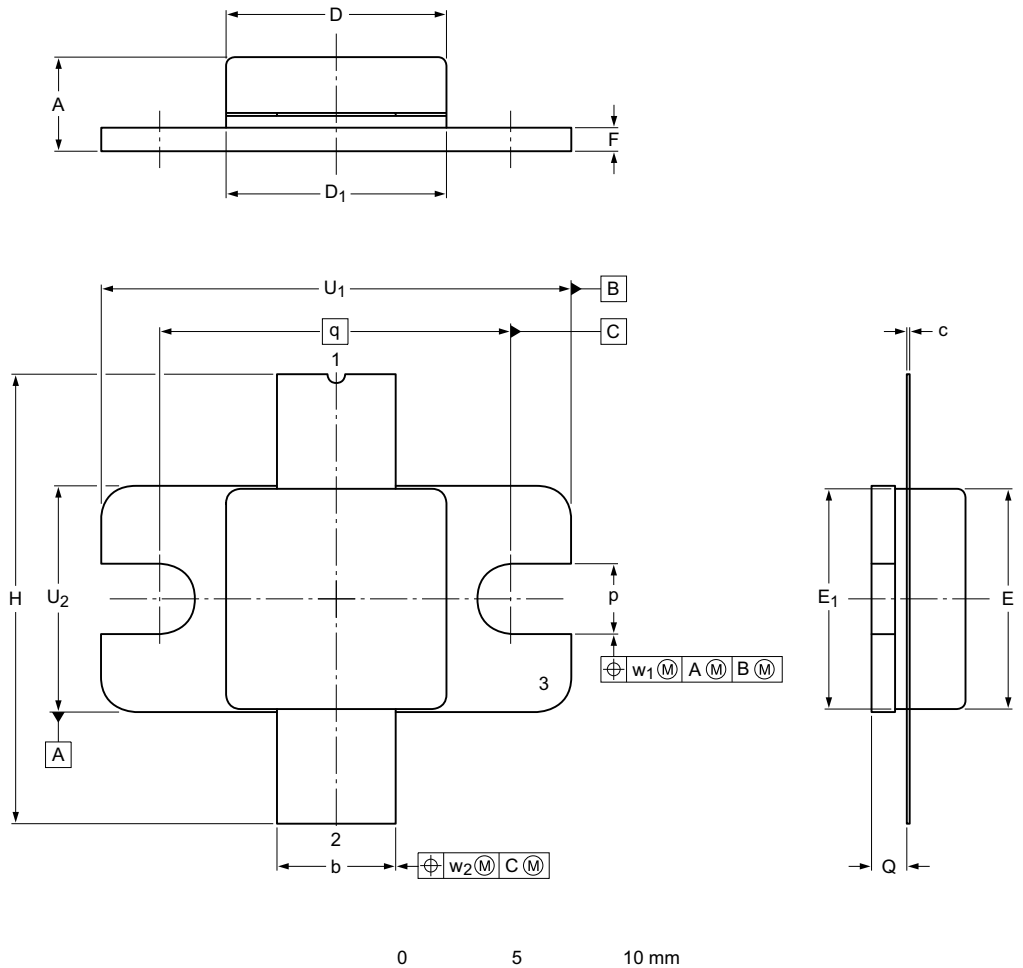
(1) f = 3.1 GHz
(2) f = 3.2 GHz
(3) f = 3.3 GHz
(4) f = 3.4 GHz
(5) f = 3.5 GHz

Fig 9. Output power as a function of input power; typical values

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8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads **SOT1135A**



Dimensions

Unit[1]		A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	max	4.65	5.26	0.18	9.65	9.65	9.65	9.65	1.14	19.94	3.30	1.70		20.45	9.91		
	nom												15.24			0.25	0.51
	min	3.76	5.00	0.10	9.40	9.40	9.40	9.40	0.89	18.92	2.92	1.45		20.19	9.65		
inches	max	0.183	0.207	0.007	0.38	0.38	0.38	0.38	0.045	0.785	0.130	0.067		0.805	0.39		
	nom												0.6			0.01	0.02
	min	0.148	0.197	0.004	0.37	0.37	0.37	0.37	0.035	0.745	0.115	0.057		0.795	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.

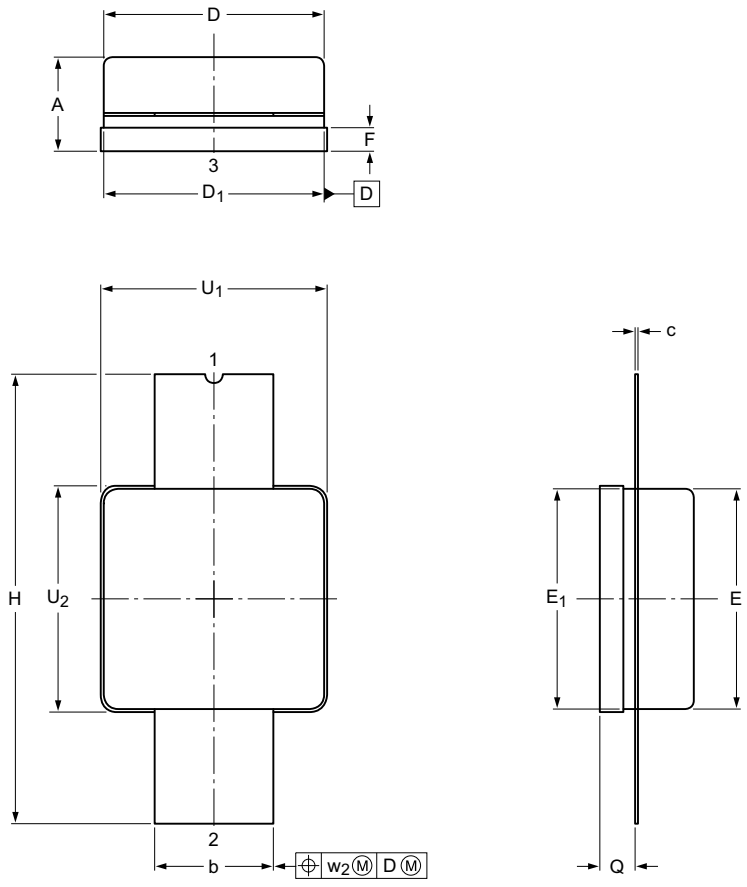
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Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1135A						~~09-10-12~~ 09-12-14

Fig 10. Package outline SOT1135A

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Earless flanged ceramic package; 2 leads **SOT1135B**



Dimensions

Unit[1]		A	b	c	D	D_1	E	E_1	F	H	Q	U_1	U_2	w_2
mm	max	4.65	5.26	0.18	9.65	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	9.65	
inches	max	0.183	0.207	0.007	0.38	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	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 11. Package outline SOT1135B

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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.

Table 9. ESD sensitivity

ESD model	Class
Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002	C2A [1]
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	2 [2]

[1] CDM classification C2A is granted to any part that passes after exposure to an ESD pulse of 500 V, but fails after exposure to an ESD pulse of 750 V.

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 V, but fails after exposure to an ESD pulse of 4000 V.

10. Abbreviations

Table 10. Abbreviations

Acronym	Description
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
S-band	Short wave Band
VSWR	Voltage Standing-Wave Ratio

11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLS9G2735L-50_2735LS-50 v.1	20171006	Product data sheet	-	-

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Document status[1][2]	Product status[3]	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

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 3
6 Characteristics 3
7 Test information 4
7.1 Ruggedness in class-AB operation 4
7.2 Impedance information 4
7.3 Graphical data 5
7.3.1 Frequency range from 2.7 GHz to 3.1 GHz . . . 5
7.3.2 Frequency range from 3.1 GHz to 3.5 GHz . . . 7
8 Package outline 9
9 Handling information 11
10 Abbreviations 11
11 Revision history 11
12 Legal information 12
12.1 Data sheet status 12
12.2 Definitions 12
12.3 Disclaimers 12
12.4 Trademarks 13
13 Contact information 13
14 Contents 14

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