



# BGY787

750 MHz, 21.5 dB gain push-pull

Rev. 9 — 19 September 2011

Product data sheet

## 1. Product profile

### 1.1 General description

Hybrid amplifier module in a SOT115J package operating with a voltage supply of 24 V (DC).

#### CAUTION



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

### 1.2 Features and benefits

- Extremely low noise
- Silicon nitride passivation
- Rugged construction
- Gold metallization ensures excellent reliability
- Excellent linearity

### 1.3 Applications

- CATV systems operating in the frequency range of 40 MHz to 750 MHz

### 1.4 Quick reference data

Table 1. Quick reference data

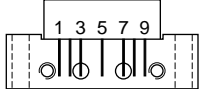
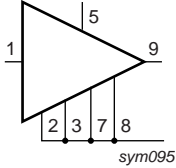
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$f = 50 \text{ MHz}$	21	21.5	22	dB
		$f = 750 \text{ MHz}$	21.5	22.5	-	dB
$I_{\text{tot}}$	total current consumption (DC)	$V_B = 24 \text{ V}$	[1] -	220	240	mA

[1] The module normally operates at  $V_B = 24 \text{ V}$ , but is able to withstand supply transients up to 30 V.



## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Symbol
1	input		
2	common		
3	common		
5	+V <sub>B</sub>		
7	common		
8	common		
9	output		

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BGY787	-	rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 × 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads	SOT115J

## 4. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>i</sub>	RF input voltage		-	60	dBmV
T <sub>stg</sub>	storage temperature		-40	+100	°C
T <sub>mb</sub>	mounting base temperature		-20	+100	°C

## 5. Characteristics

**Table 5. Characteristics at bandwidth 40 MHz to 750 MHz**

$V_B = 24\text{ V}$ ;  $T_{case} = 30\text{ °C}$ ;  $Z_S = Z_L = 75\ \Omega$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$f = 50\text{ MHz}$	21	21.5	22	dB
		$f = 750\text{ MHz}$	21.5	22.5	-	dB
SL	slope cable equivalent	$f = 40\text{ MHz to }750\text{ MHz}$	0	1	1.5	dB
FL	flatness of frequency response	$f = 40\text{ MHz to }750\text{ MHz}$	-	$\pm 0.2$	$\pm 0.5$	dB
$S_{11}$	input return losses	$f = 40\text{ MHz to }80\text{ MHz}$	20	33	-	dB
		$f = 80\text{ MHz to }160\text{ MHz}$	18.5	30	-	dB
		$f = 160\text{ MHz to }320\text{ MHz}$	17	25	-	dB
		$f = 320\text{ MHz to }640\text{ MHz}$	15.5	22	-	dB
		$f = 640\text{ MHz to }750\text{ MHz}$	14	20.5	-	dB
$S_{22}$	output return losses	$f = 40\text{ MHz to }80\text{ MHz}$	20	28.5	-	dB
		$f = 80\text{ MHz to }160\text{ MHz}$	18.5	27.5	-	dB
		$f = 160\text{ MHz to }320\text{ MHz}$	17	25	-	dB
		$f = 320\text{ MHz to }640\text{ MHz}$	15.5	22	-	dB
		$f = 640\text{ MHz to }750\text{ MHz}$	14	20	-	dB
$\varphi_{S21}$	phase response	$f = 50\text{ MHz}$	-45	-	+45	deg
CTB	composite triple beat	110 channels flat; $V_o = 44\text{ dBmV}$ ; measured at 745.25 MHz	-	-54.5	-53	dB
$X_{mod}$	cross modulation	110 channels flat; $V_o = 44\text{ dBmV}$ ; measured at 55.25 MHz	-	-54	-52	dB
CSO	composite second order distortion	110 channels flat; $V_o = 44\text{ dBmV}$ ; measured at 746.5 MHz	-	-57.5	-53	dB
$d_2$	second order distortion		[1] -	-75	-63	dB
$V_o$	output voltage	$d_{im} = -60\text{ dB}$	[2] 61	63	-	dBmV
F	noise figure	$f = 50\text{ MHz}$	-	4	5	dB
		$f = 450\text{ MHz}$	-	-	5.5	dB
		$f = 550\text{ MHz}$	-	-	5.5	dB
		$f = 600\text{ MHz}$	-	-	6	dB
		$f = 750\text{ MHz}$	-	5	6.5	dB
$I_{tot}$	total current consumption (DC)		[3] -	220	240	mA

[1]  $f_p = 55.25\text{ MHz}$ ;  $V_p = 44\text{ dBmV}$ ;  $f_q = 691.25\text{ MHz}$ ;  $V_q = 44\text{ dBmV}$ ; measured at  $f_p + f_q = 746.5\text{ MHz}$ .

[2] Measure according to DIN45004B;

$f_p = 740.25\text{ MHz}$ ;  $V_p = V_o$ ;  $f_q = 747.25\text{ MHz}$ ;  $V_q = V_o - 6\text{ dB}$ ;  $f_r = 749.25\text{ MHz}$ ;  $V_r = V_o - 6\text{ dB}$ ; measured at  $f_p + f_q - f_r = 738.25\text{ MHz}$ .

[3] The module normally operates at  $V_B = 24\text{ V}$ , but is able to withstand supply transients up to 30 V.

**Table 6. Characteristics at bandwidth 40 MHz to 770 MHz** $V_B = 24\text{ V}$ ;  $T_{case} = 30\text{ °C}$ ;  $Z_S = Z_L = 75\ \Omega$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G <sub>p</sub>	power gain	f = 50 MHz	21	21.5	22	dB	
		f = 770 MHz	21.5	22.5	-	dB	
SL	slope cable equivalent	f = 40 MHz to 770 MHz	0	1	1.5	dB	
FL	flatness of frequency response	f = 40 MHz to 770 MHz	-	±0.2	±0.5	dB	
S <sub>11</sub>	input return losses	f = 40 MHz to 80 MHz	20	33	-	dB	
		f = 80 MHz to 160 MHz	18.5	30	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 640 MHz	15.5	22.5	-	dB	
		f = 640 MHz to 770 MHz	14	20.5	-	dB	
S <sub>22</sub>	output return losses	f = 40 MHz to 80 MHz	20	28.5	-	dB	
		f = 80 MHz to 160 MHz	18.5	27.5	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 640 MHz	15.5	22	-	dB	
		f = 640 MHz to 770 MHz	14	20	-	dB	
φ <sub>S21</sub>	phase response	f = 50 MHz	-45	-	+45	deg	
CTB	composite triple beat	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 745.25 MHz	-	-54.5	-53	dB	
X <sub>mod</sub>	cross modulation	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	-	-54	-52	dB	
CSO	composite second order distortion	110 channels flat; V <sub>o</sub> = 44 dBmV; measured at 746.5 MHz	-	-57.5	-53	dB	
d <sub>2</sub>	second order distortion		[1]	-	-75	-63	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = -60 dB	[2]	61	63	-	dBmV
F	noise figure	f = 50 MHz	-	4	5	dB	
		f = 450 MHz	-	-	5.5	dB	
		f = 550 MHz	-	-	5.5	dB	
		f = 600 MHz	-	-	6	dB	
		f = 770 MHz	-	5	6.5	dB	
I <sub>tot</sub>	total current consumption (DC)		[3]	-	220	240	mA

[1] f<sub>p</sub> = 55.25 MHz; V<sub>p</sub> = 44 dBmV; f<sub>q</sub> = 691.25 MHz; V<sub>q</sub> = 44 dBmV; measured at f<sub>p</sub> + f<sub>q</sub> = 746.5 MHz.

[2] Measure according to DIN45004B;

f<sub>p</sub> = 740.25 MHz; V<sub>p</sub> = V<sub>o</sub>; f<sub>q</sub> = 747.25 MHz; V<sub>q</sub> = V<sub>o</sub> - 6 dB; f<sub>r</sub> = 749.25 MHz; V<sub>r</sub> = V<sub>o</sub> - 6 dB; measured at f<sub>p</sub> + f<sub>q</sub> - f<sub>r</sub> = 738.25 MHz.

[3] The module normally operates at V<sub>B</sub> = 24 V, but is able to withstand supply transients up to 30 V.

**Table 7. Characteristics at bandwidth 40 MHz to 600 MHz** $V_B = 24\text{ V}$ ;  $T_{case} = 30\text{ °C}$ ;  $Z_S = Z_L = 75\ \Omega$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G <sub>p</sub>	power gain	f = 50 MHz	21	21.5	22	dB	
		f = 600 MHz	21.5	-	-	dB	
SL	slope cable equivalent	f = 40 MHz to 600 MHz	0	-	1.5	dB	
FL	flatness of frequency response	f = 40 MHz to 600 MHz	-	-	±0.3	dB	
S <sub>11</sub>	input return losses	f = 40 MHz to 80 MHz	20	33	-	dB	
		f = 80 MHz to 160 MHz	18.5	30	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 600 MHz	16	22.5	-	dB	
S <sub>22</sub>	output return losses	f = 40 MHz to 80 MHz;	20	28.5	-	dB	
		f = 80 MHz to 160 MHz	18.5	27.5	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 600 MHz	16	22	-	dB	
∅S <sub>21</sub>	phase response	f = 50 MHz	-45	-	+45	deg	
CTB	composite triple beat	85 channels flat; V <sub>o</sub> = 44 dBmV; measured at 595.25 MHz	-	-59.5	-58	dB	
X <sub>mod</sub>	cross modulation	85 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	-	-55.5	-53	dB	
CSO	composite second order distortion	85 channels flat; V <sub>o</sub> = 44 dBmV; measured at 596.5 MHz	-	-64	-56	dB	
d <sub>2</sub>	second order distortion		[1]	-	-	-68	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = -60 dB	[2]	62.5	-	-	dBmV
F	noise figure	see <a href="#">Table 5</a>	-	-	-	dB	
I <sub>tot</sub>	total current consumption (DC)		[3]	-	220	240	mA

[1] f<sub>p</sub> = 55.25 MHz; V<sub>p</sub> = 44 dBmV; f<sub>q</sub> = 541.25 MHz; V<sub>q</sub> = 44 dBmV; measured at f<sub>p</sub> + f<sub>q</sub> = 596.5 MHz.

[2] Measure according to DIN45004B;

f<sub>p</sub> = 590.25 MHz; V<sub>p</sub> = V<sub>o</sub>; f<sub>q</sub> = 597.25 MHz; V<sub>q</sub> = V<sub>o</sub> - 6 dB; f<sub>r</sub> = 599.25 MHz; V<sub>r</sub> = V<sub>o</sub> - 6 dB; measured at f<sub>p</sub> + f<sub>q</sub> - f<sub>r</sub> = 588.25 MHz.

[3] The module normally operates at V<sub>B</sub> = 24 V, but is able to withstand supply transients up to 30 V.

**Table 8. Characteristics at bandwidth 40 MHz to 550 MHz** $V_B = 24\text{ V}$ ;  $T_{\text{case}} = 30\text{ °C}$ ;  $Z_S = Z_L = 75\ \Omega$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G <sub>p</sub>	power gain	f = 50 MHz	21	21.5	22	dB	
		f = 550 MHz	21.5	-	-	dB	
SL	slope cable equivalent	f = 40 MHz to 550 MHz	0	-	1.5	dB	
FL	flatness of frequency response	f = 40 MHz to 550 MHz	-	-	±0.3	dB	
S <sub>11</sub>	input return losses	f = 40 MHz to 80 MHz	20	33	-	dB	
		f = 80 MHz to 160 MHz	18.5	30	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 550 MHz	16	22.5	-	dB	
S <sub>22</sub>	output return losses	f = 40 MHz to 80 MHz	20	28.5	-	dB	
		f = 80 MHz to 160 MHz	18.5	27.5	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 550 MHz	16	22	-	dB	
φ <sub>S21</sub>	phase response	f = 50 MHz	-45	-	+45	deg	
CTB	composite triple beat	77 channels flat; V <sub>o</sub> = 44 dBmV; measured at 547.25 MHz	-	-61	-60	dB	
X <sub>mod</sub>	cross modulation	77 channels flat; V <sub>o</sub> = 44 dBmV; measured at 55.25 MHz	-	-56.5	-55	dB	
CSO	composite second order distortion	77 channels flat; V <sub>o</sub> = 44 dBmV; measured at 548.5 MHz	-	-65.5	-58	dB	
d <sub>2</sub>	second order distortion		[1]	-	-	-70	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = -60 dB	[2]	63	-	-	dBmV
F	noise figure	see <a href="#">Table 5</a>	-	-	-	dB	
I <sub>tot</sub>	total current consumption (DC)		[3]	-	220	240	mA

[1] f<sub>p</sub> = 55.25 MHz; V<sub>p</sub> = 44 dBmV; f<sub>q</sub> = 493.25 MHz; V<sub>q</sub> = 44 dBmV; measured at f<sub>p</sub> + f<sub>q</sub> = 548.5 MHz.

[2] Measure according to DIN45004B;

f<sub>p</sub> = 540.25 MHz; V<sub>p</sub> = V<sub>o</sub>; f<sub>q</sub> = 547.25 MHz; V<sub>q</sub> = V<sub>o</sub> - 6 dB; f<sub>r</sub> = 549.25 MHz; V<sub>r</sub> = V<sub>o</sub> - 6 dB; measured at f<sub>p</sub> + f<sub>q</sub> - f<sub>r</sub> = 538.25 MHz.

[3] The module normally operates at V<sub>B</sub> = 24 V, but is able to withstand supply transients up to 30 V.

**Table 9. Characteristics at bandwidth 40 MHz to 450 MHz** $V_B = 24\text{ V}$ ;  $T_{case} = 30\text{ °C}$ ;  $Z_S = Z_L = 75\ \Omega$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit	
G <sub>p</sub>	power gain	f = 50 MHz	21	21.5	22	dB	
		f = 450 MHz	21.5	-	-	dB	
SL	slope cable equivalent	f = 40 MHz to 450 MHz	0	-	1.5	dB	
FL	flatness of frequency response	f = 40 MHz to 450 MHz	-	-	±0.3	dB	
S <sub>11</sub>	input return losses	f = 40 MHz to 80 MHz	20	33	-	dB	
		f = 80 MHz to 160 MHz	18.5	30	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 450 MHz	16	22.5	-	dB	
S <sub>22</sub>	output return losses	f = 40 MHz to 80 MHz	20	28.5	-	dB	
		f = 80 MHz to 160 MHz	18.5	27.5	-	dB	
		f = 160 MHz to 320 MHz	17	25	-	dB	
		f = 320 MHz to 450 MHz	16	22	-	dB	
∅S <sub>21</sub>	phase response	f = 50 MHz	-45	-	+45	deg	
CTB	composite triple beat	60 channels flat; V <sub>o</sub> = 46 dBmV; measured at 445.25 MHz	-	-	-59	dB	
X <sub>mod</sub>	cross modulation	60 channels flat; V <sub>o</sub> = 46 dBmV; measured at 55.25 MHz	-	-	-54	dB	
CSO	composite second order distortion	60 channels flat; V <sub>o</sub> = 46 dBmV; measured at 446.5 MHz	-	-	-60	dB	
d <sub>2</sub>	second order distortion		[1]	-	-	-73	dB
V <sub>o</sub>	output voltage	d <sub>im</sub> = -60 dB	[2]	64	-	-	dBmV
F	noise figure	see <a href="#">Table 5</a>	-	-	-	dB	
I <sub>tot</sub>	total current consumption (DC)		[3]	-	220	240	mA

[1] f<sub>p</sub> = 55.25 MHz; V<sub>p</sub> = 46 dBmV; f<sub>q</sub> = 391.25 MHz; V<sub>q</sub> = 46 dBmV; measured at f<sub>p</sub> + f<sub>q</sub> = 446.5 MHz.

[2] Measure according to DIN45004B;

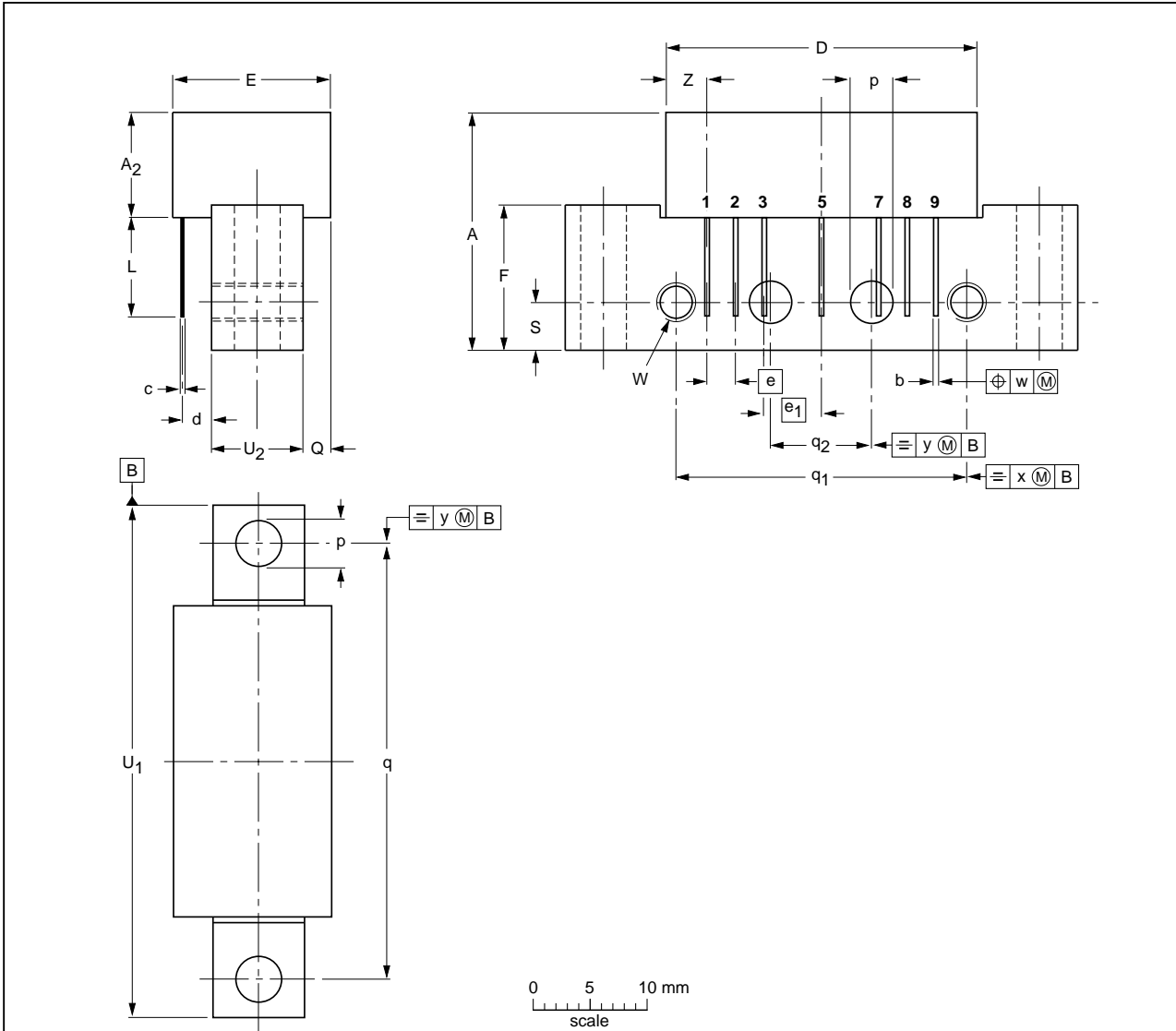
f<sub>p</sub> = 440.25 MHz; V<sub>p</sub> = V<sub>o</sub>; f<sub>q</sub> = 447.25 MHz; V<sub>q</sub> = V<sub>o</sub> - 6 dB; f<sub>r</sub> = 449.25 MHz; V<sub>r</sub> = V<sub>o</sub> - 6 dB; measured at f<sub>p</sub> + f<sub>q</sub> - f<sub>r</sub> = 438.25 MHz.

[3] The module normally operates at V<sub>B</sub> = 24 V, but is able to withstand supply transients up to 30 V.

**6. Package outline**

Rectangular single-ended package; aluminium flange; 2 vertical mounting holes; 2 x 6-32 UNC and 2 extra horizontal mounting holes; 7 gold-plated in-line leads

SOT115J



DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A <sub>2</sub> max.	b	c	D max.	d	E max.	e	e <sub>1</sub>	F	L min.	p	Q max.	q	q <sub>1</sub>	q <sub>2</sub>	S	U <sub>1</sub>	U <sub>2</sub>	W	w	x	y	Z max.
mm	20.8	9.5	0.51 0.38	0.25	27.2	2.04 2.54	13.75	2.54	5.08	12.7	8.8	4.15 3.85	2.4	38.1	25.4	10.2	4.2	44.75 44.25	8.2 7.8	6-32 UNC	0.25	0.7	0.1	3.8

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT115J						-04-02-04- 10-06-18

Fig 1. Package outline SOT115J



## 7. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGY787 v.9	20110919	Product data sheet	-	BGY787 v.8
Modifications:		<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>Package outline drawings have been updated to the latest version.</li> </ul>		
BGY787 v.8 (9397 750 14773)	20050401	Product data sheet	-	BGY787 v.7
BGY787 v.7 (9397 750 11198)	20030516	Product specification	-	BGY787 v.6
BGY787 v.6 (9397 750 08811)	20011031	Product specification	-	BGY787 v.5
BGY787 v.5 (9397 750 05455)	19990330	Product specification	-	BGY787 v.4
BGY787 v.4 (9397 750 02951)	19971124	Product specification	-	BGY787 v.3
BGY787 v.3 (9397 750 02155)	19970414	Product specification	-	-

## 8. Legal information

### 8.1 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.
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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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