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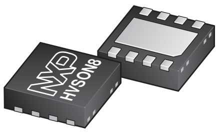


BGA7130

400 MHz to 2700 MHz 1 W high linearity silicon amplifier

Rev. 1 — 9 October 2012 Product data sheet

1. General description

The MMIC is a single-stage amplifier, offered in a leadless surface-mount package. It delivers 30 dBm output power at 1 dB gain compression and a superior performance up to 2700 MHz. Its power saving features include simple quiescent current adjustment and logic-level shutdown control to reduce the supply current to 4 μA.

2. Features and benefits

- 400 MHz to 2700 MHz frequency operating range
- Integrated active biasing
- External matching allows broad application optimization of the electrical performance
- 5 V single supply operation
- Power-down
- Excellent robustness:
  - All pins ESD protected (HBM 6 kV; CDM 2 kV)
  - Withstands mismatch of VSWR 50 : 1 through all phases
  - Withstands electrical over-stress peaks of 7 V on the supply voltage

3. Applications

In this data sheet two base station applications are described, namely LTE at 750 MHz and UMTS at 2140 MHz. The BGA7130 is also suited for a range of other applications:

- Wireless infrastructure (base station, repeater, backhaul systems)
- Broadband CPE / MoCA
- Industrial applications
- WLAN / ISM / RFID
- Satellite Master Antenna TV (SMATV)

4. Quick reference data

Table 1. Quick reference data

4.75 V ≤ V_{SUP} ≤ 5.25 V; –40 °C ≤ T_{case} ≤ +85 °C; P_i < –20 dBm; R3 = 523 Ω (tolerance 1 %); input and output impedances matched to 50 Ω (see Section 14); pin ENABLE = HIGH; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{SUP}	supply voltage		[1]	4.75	-	5.25	V
$I_{CC(tot)}$	total supply current		[2]	390	450	510	mA
		500 Ω ≤ R3 ≤ 4.7 kΩ	[2]	50	-	550	mA
		500 Ω ≤ R3 ≤ 4.7 kΩ; pin ENABLE = LOW	[2]	-	4	6	μA

Table 1. Quick reference data *…continued*

4.75 V ≤ V_{SUP} ≤ 5.25 V; –40 °C ≤ T_{case} ≤ +85 °C; P_i < –20 dBm; R3 = 523 Ω (tolerance 1 %); input and output impedances matched to 50 Ω (see Section 14); pin ENABLE = HIGH; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
T_{case}	case temperature		[3]	–40	+25	+85	°C
f	frequency			400	-	2700	MHz
Measured at LTE-750 MHz (see Section 14)							
f	frequency		[4]	728	748	768	MHz
G_p	power gain	728 MHz ≤ f ≤ 768 MHz		17	20	23	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	728 MHz ≤ f ≤ 768 MHz		27	30.5	-	dBm
$IP3_O$	output third-order intercept point	728 MHz ≤ f ≤ 768 MHz; P_L = 19 dBm per tone; tone spacing = 1 MHz		39	42.5	-	dBm
Measured at UMTS-2140 MHz (see Section 14)							
f	frequency		[5]	2110	2140	2170	MHz
G_p	power gain	2110 MHz ≤ f ≤ 2170 MHz		9	12	15	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	2110 MHz ≤ f ≤ 2170 MHz		27	30	-	dBm
$IP3_O$	output third-order intercept point	2110 MHz ≤ f ≤ 2170 MHz; P_L = 19 dBm per tone; tone spacing = 1 MHz		40.5	44	-	dBm

[1] Supply voltage on pins RF_OUT and V_{CC}.

[2] Current through pins RF_OUT and V_{CC}.

[3] T_{case} is the temperature at the soldering point of the exposed die pad.

[4] Covering downlink frequency range of eUTRAN bands 11, 13, 14 and 17.

[5] Covering downlink frequency range of eUTRAN bands 1, 4 and 10.

5. Design support

Table 2. Available design support

Download from the BGA7130 product page on http://www.nxp.com.

Support item	Available		Remarks
Device models for Agilent EEsof EDA ADS	planned	[1]	Based on Mextram device model.
Device models for AWR Microwave Office	no	[1]	Based on Mextram device model.
Device models for ANSYS Ansoft designer	no	[1]	Based on Mextram device model.
SPICE model	planned	[1]	Based on Gummel-Poon device model.
S-parameters	yes		
Noise parameters	yes		
Customer evaluation kit	yes		See Section 6 and Section 14.
Gerber files	yes		Gerber files of boards provided with the customer evaluation kit.
Solder pattern	yes		

[1] See http://www.nxp.com/models.html.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BGA7130	HVSON8	plastic thermal enhanced very thin small outline package; no leads; 8 terminals; body 3 × 3 × 0.85 mm	SOT908-3
OM7941/BGA7130LTE	-	Customer evaluation kit for BGA7130 in a 750 MHz LTE application [1]	-
OM7942/BGA7130WCDMA	-	Customer evaluation kit for BGA7130 in a 2140 MHz UMTS application [1]	-

[1] The customer evaluation kit contains the following:

a) Fully populated and matched RF evaluation board

b) BGA7130 samples

7. Functional diagram

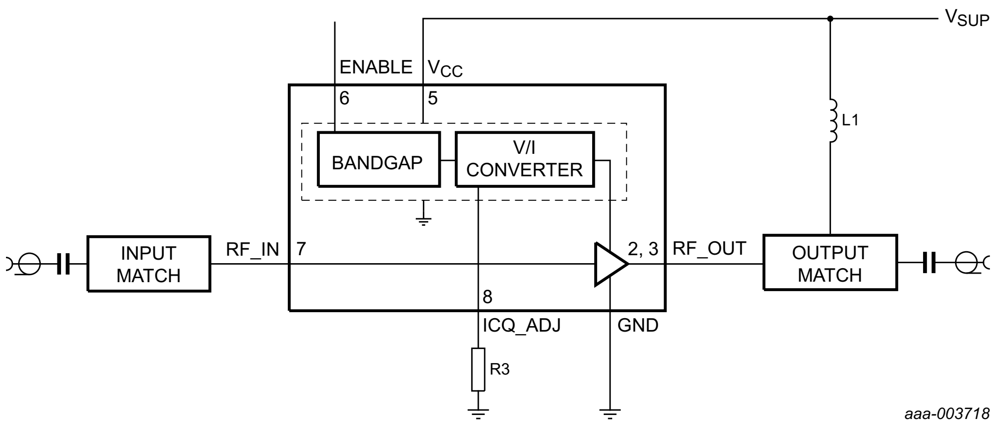


Fig 1. Functional diagram

8. Pinning information

8.1 Pinning

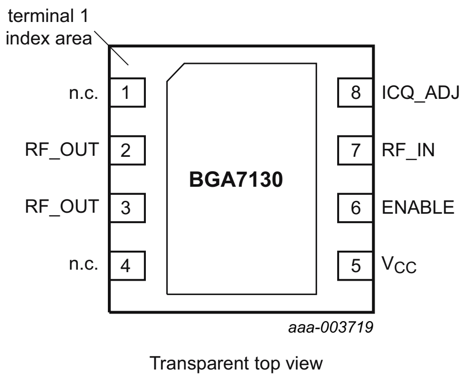


Fig 2. Pin configuration

8.2 Pin description

Table 4. Pin description

Symbol	Pin	Description
n.c.	1, 4	not connected [1]
RF_OUT	2, 3	RF output and supply to the amplifier [2]
V_{CC}	5	bias supply voltage [3]
ENABLE	6	enable
RF_IN	7	RF input [2]
ICQ_ADJ	8	quiescent collector current adjustment by an external resistor
GND	exposed die pad	ground [4]

[1] This pin can be connected to ground.

[2] This pin requires an external DC-blocking capacitor.

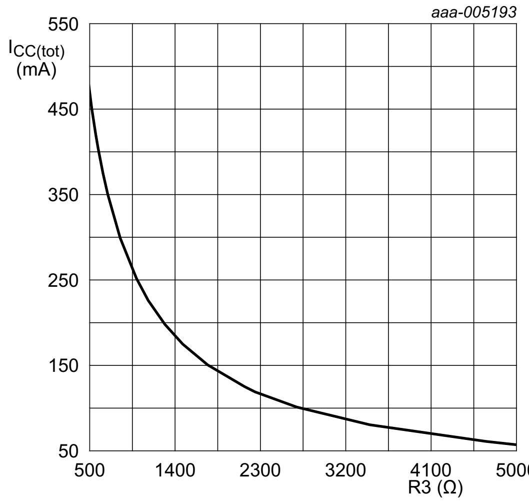
[3] RF decoupled.

[4] The exposed die pad of the SOT908-3 also functions as heatsink for the power amplifier.

9. Functional description

9.1 Supply current adjustment

The supply current can be adjusted by changing the value of biasing resistor R3 which connects pin ICQ_ADJ (pin 8) to ground (see Figure 1).



V_{SUP} = 5 V; T_{amb} = 25 °C.

Fig 3. Supply current $I_{CC(tot)}$ as function of biasing resistor R3; typical values

9.2 Enable control

The BGA7130 can be powered down using enable pin 6 (ENABLE). In case this control function is not needed the enable pin can be connected to the bias supply voltage pin 5 (V_{CC}). The current through the enable pin 6 should never exceed 20 mA as this might damage the ESD protection circuitry. This can be avoided either by preventing the voltage on this pin to exceed the supply voltage (V_{SUP}) or by adding a series resistor.

Table 5. Enable truth table

Logic level on pin ENABLE (pin 6)	Status BGA7130
LOW	powered down
HIGH	powered on

10. Limiting values

Table 6. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{SUP}	supply voltage		[1]	−0.5	+7	V
$V_{I(dig)}$	digital input voltage		[2][4]	0	V_{SUP}	V
$I_{I(dig)}$	digital input current		[3][4]	−20	+20	mA
$I_{CC(tot)}$	total supply current			-	1000	mA

Table 6. Limiting values *...continued*

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

Symbol	Parameter	Conditions	Min	Max	Unit
$P_{i(RF)}$	RF input power	f = 750 MHz; switched	-	18	dBm
		f = 2140 MHz; switched	-	25	dBm
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature		-	150	°C
V_{ESD}	electrostatic discharge voltage	Human Body Model (HBM); According JEDEC standard 22-A114E	-	6	kV
		Charged Device Model (CDM); According JEDEC standard 22-C101B	-	2	kV

[1] Absolute maximum DC voltage on pins RF_OUT, ICQ_ADJ and V_{CC}.

[2] Absolute maximum DC voltage on pin ENABLE.

[3] Absolute maximum DC current through pin ENABLE.

[4] If $V_{I(dig)}$ exceeds V_{SUP} the internal ESD protection circuit can be damaged. The pin ENABLE can be connected to V_{CC} in case the enable control function is not used (see Section 9.2).

11. Thermal characteristics

Table 7. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	T_{case} < 85 °C	6	K/W

12. Static characteristics

Table 8. Static characteristics

4.75 V ≤ V_{SUP} ≤ 5.25 V; −40 °C ≤ T_{case} ≤ +85 °C; P_i < −20 dBm; R3 = 523 Ω (tolerance 1 %); input and output impedances matched to 50 Ω (see Section 14); pin ENABLE = HIGH; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{SUP}	supply voltage		[1]	4.75	-	5.25	V
$I_{CC(tot)}$	total supply current		[2]	390	450	510	mA
		0 Ω ≤ R3 ≤ 5 kΩ	[2]	30	-	550	mA
		0 Ω ≤ R3 ≤ 5 kΩ; pin ENABLE = LOW	[2]	-	4	6	μA
T_{case}	case temperature		[3]	−40	+25	+85	°C
I_{CC}	supply current	on pin RF_OUT		-	420	-	mA
		on pin V_{CC}		-	30	-	mA
		on pin ENABLE		-	-	3	μA
V_{IL}	LOW-level input voltage		[4]	0	-	0.7	V
V_{IH}	HIGH-level input voltage		[4]	2.5	-	V_{SUP}	V

[1] Supply voltage on pins RF_OUT and V_{CC}.

[2] Current through pins RF_OUT and V_{CC}.

[3] T_{case} is the temperature at the soldering point of the exposed die pad.

[4] On digital input pin ENABLE.

13. Dynamic characteristics

Table 9. Dynamic characteristics

4.75 V ≤ V_{SUP} ≤ 5.25 V; –40 °C ≤ T_{case} ≤ 85 °C; P_i < –20 dBm; R3 = 523 Ω (tolerance 1 %); input and output impedances matched to 50 Ω (see Section 14); pin ENABLE = HIGH; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
f	frequency			400	-	2700	MHz
Measured at LTE-750 MHz (see Section 14)							
f	frequency		[1]	728	748	768	MHz
G_p	power gain	728 MHz ≤ f ≤ 768 MHz		17	20	23	dB
		728 MHz ≤ f ≤ 768 MHz; pin ENABLE = LOW		-	–18	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	728 MHz ≤ f ≤ 768 MHz		27	30.5	-	dBm
$IP3_O$	output third-order intercept point	728 MHz ≤ f ≤ 768 MHz; P_L = 15 dBm per tone; tone spacing = 1 MHz		39	42.5	-	dBm
EVM	error vector magnitude	E-UTRA Test Model (E-TM) 3.1 LTE; $P_{L(AV)}$ = 20 dBm		-	2	-	%
NF	noise figure	728 MHz ≤ f ≤ 768 MHz		-	5	-	dB
RL_{in}	input return loss	728 MHz ≤ f ≤ 768 MHz		-	6	-	dB
		728 MHz ≤ f ≤ 768 MHz; pin ENABLE = LOW		-	1	-	dB
RL_{out}	output return loss	728 MHz ≤ f ≤ 768 MHz		-	10	-	dB
		728 MHz ≤ f ≤ 768 MHz; pin ENABLE = LOW		-	0.5	-	dB
ISL	isolation	728 MHz ≤ f ≤ 768 MHz		-	29	-	dB
		728 MHz ≤ f ≤ 768 MHz; pin ENABLE = LOW		-	18	-	dB
$t_{d(pu)}$	power-up delay time	after pin ENABLE is switched to logic HIGH; to within 0.1 dB of final gain state.		-	3	-	μs
$t_{d(pd)}$	power-down delay time	after pin ENABLE is switched to logic LOW; to within 0.1 dB of final gain state.		-	0.5	-	μs
Measured at UMTS-2140 MHz (see Section 14)							
f	frequency		[2]	2110	2140	2170	MHz
G_p	power gain	2110 MHz ≤ f ≤ 2170 MHz		9	12	15	dB
		2110 MHz ≤ f ≤ 2170 MHz; pin ENABLE = LOW		-	–15	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	2110 MHz ≤ f ≤ 2170 MHz		27	30	-	dBm
$IP3_O$	output third-order intercept point	2110 MHz ≤ f ≤ 2170 MHz; P_L = 15 dBm per tone; tone spacing = 1 MHz		41	44	-	dBm
ACPR	adjacent channel power ratio	2110 MHz ≤ f ≤ 2170 MHz	[3]	-	–60	-	dBc
NF	noise figure	2110 MHz ≤ f ≤ 2170 MHz		-	5	-	dB
RL_{in}	input return loss	2110 MHz ≤ f ≤ 2170 MHz		-	6	-	dB
		2110 MHz ≤ f ≤ 2170 MHz; pin ENABLE = LOW		-	3	-	dB
RL_{out}	output return loss	2110 MHz ≤ f ≤ 2170 MHz		-	10	-	dB
		2110 MHz ≤ f ≤ 2170 MHz; pin ENABLE = LOW		-	1	-	dB

Table 9. Dynamic characteristics *...continued*

$4.75\ V \leq V_{SUP} \leq 5.25\ V$; $-40\ °C \leq T_{case} \leq 85\ °C$; $P_i < -20$ dBm; R3 = 523 Ω (tolerance 1 %); input and output impedances matched to 50 Ω (see Section 14); pin ENABLE = HIGH; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
ISL	isolation	2110 MHz ≤ f ≤ 2170 MHz	-	24	-	dB
		2110 MHz ≤ f ≤ 2170 MHz; pin ENABLE = LOW	-	15	-	dB
$t_{d(pu)}$	power-up delay time	after pin ENABLE is switched to logic HIGH; to within 0.1 dB of final gain state.	-	3	-	μs
$t_{d(pd)}$	power-down delay time	after pin ENABLE is switched to logic LOW; to within 0.1 dB of final gain state.	-	0.5	-	μs

[1] Covering downlink frequency range of eUTRAN bands 11, 13, 14 and 17.

[2] Covering downlink frequency range of eUTRAN bands 1, 4 and 10.

[3] Two carrier W-CDMA; each carrier according to 3GPP test model 1; 64 DPCH; PAR for composite signal = 7 dB; 5 MHz carrier spacing.

14. Application information

The BGA7130 can be used for a wide variety of applications. This section describes two example base station applications: LTE at 750 MHz and UMTS at 2140 MHz. It serves as a pre-driver for the high-power amplifier in the Base Transceiver Station (BTS), see Figure 4.

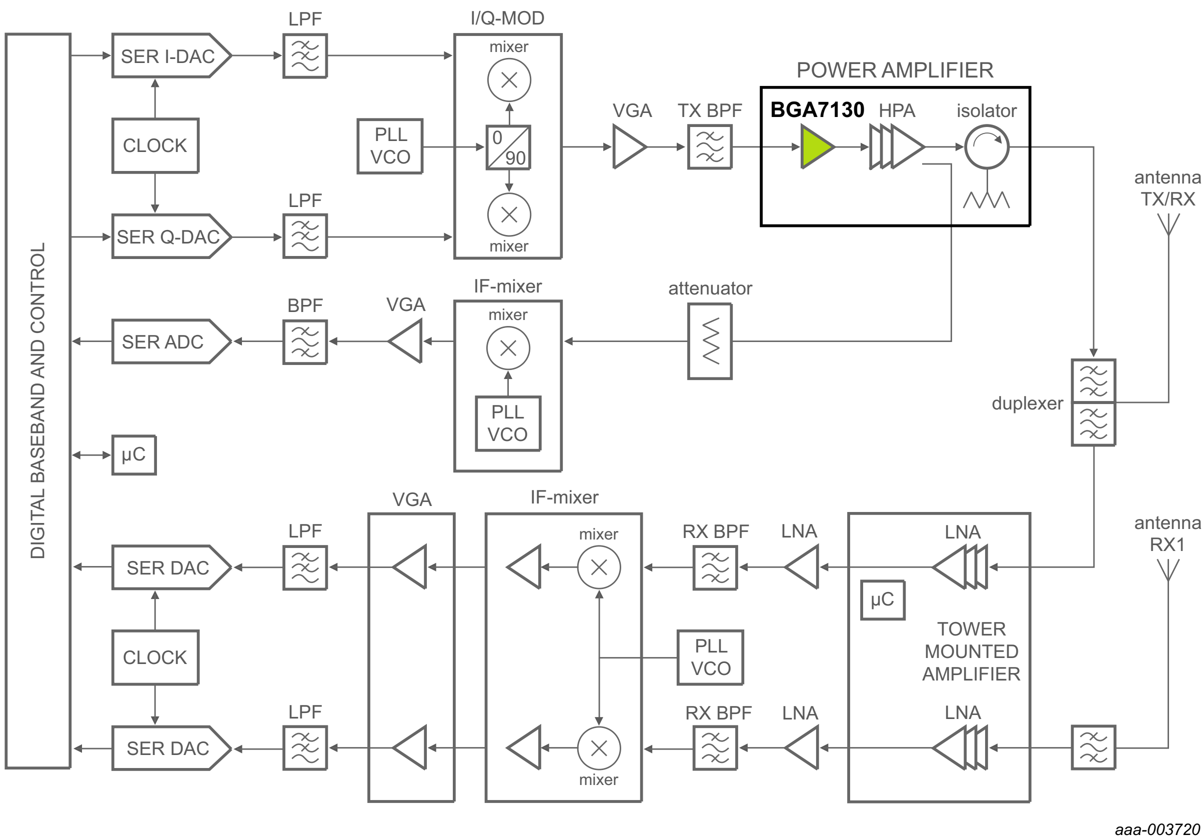


Fig 4. Simplified schematic representation of a Base Transceiver Station (BTS)

The LTE 750 MHz circuit described here is matched for the downlink frequency range of band 12, 13, 14 and 17 as defined in the evolved UMTS Terrestrial Radio Access Network (eUTRAN) air interface of Long Term Evolution (LTE) mobile networks. These bands are used in the United States and are expected to be used in Canada in the future. Band 12, 13 and 14 are commonly referred to as SMH bands.

Table 10. Covered LTE downlink bands

eUTRAN band	Uplink	Downlink	Region
XII (12) - SMH	698 MHz to 716 MHz	728 MHz to 746 MHz	United States, Canada
XIII (13) - SMH	776 MHz to 787 MHz	746 MHz to 757 MHz	United States, Canada
XIV (14) - SMH	788 MHz to 798 MHz	758 MHz to 768 MHz	United States, Canada
XVII (17)	704 MHz to 716 MHz	734 MHz to 746 MHz	United States, Canada

The UMTS 2140 MHz circuit described here is matched for the downlink frequency range of band 1, 4 and 10 as defined in the evolved UMTS Terrestrial Radio Access Network (eUTRAN) air interface of the Universal Mobile Telecommunications System (UMTS) mobile networks.

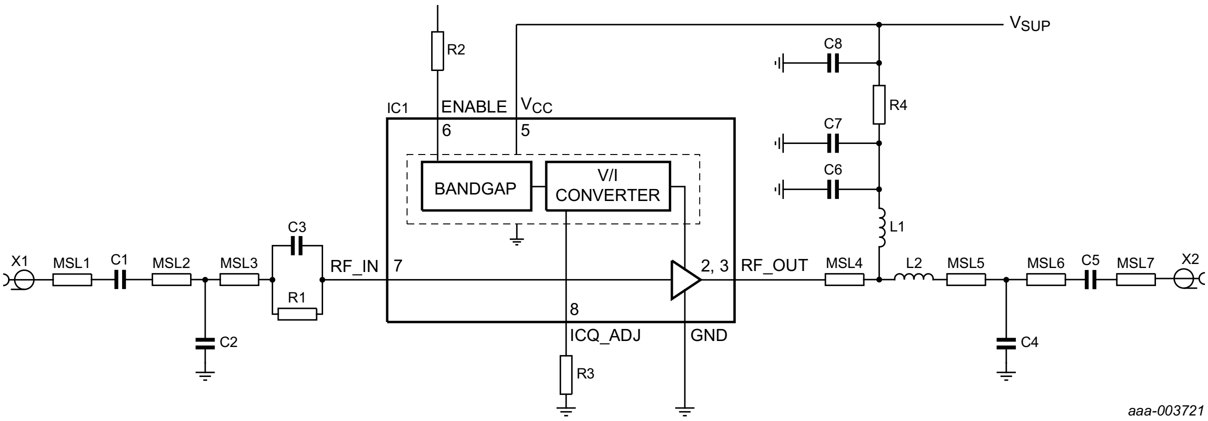
Table 11. Covered UMTS bands

eUTRAN band	Uplink	Downlink	Region
I (1) - UMTS	1920 MHz to 1980 MHz	2110 MHz to 2170 MHz	Japan, Europe, Asia
IV (4) - AWS	1710 MHz to 1755 MHz	2110 MHz to 2155 MHz	United States, Canada, Latin America
X (10) - UMTS	1710 MHz to 1770 MHz	2110 MHz to 2170 MHz	Uruguay, Ecuador, Peru

14.1 Application board

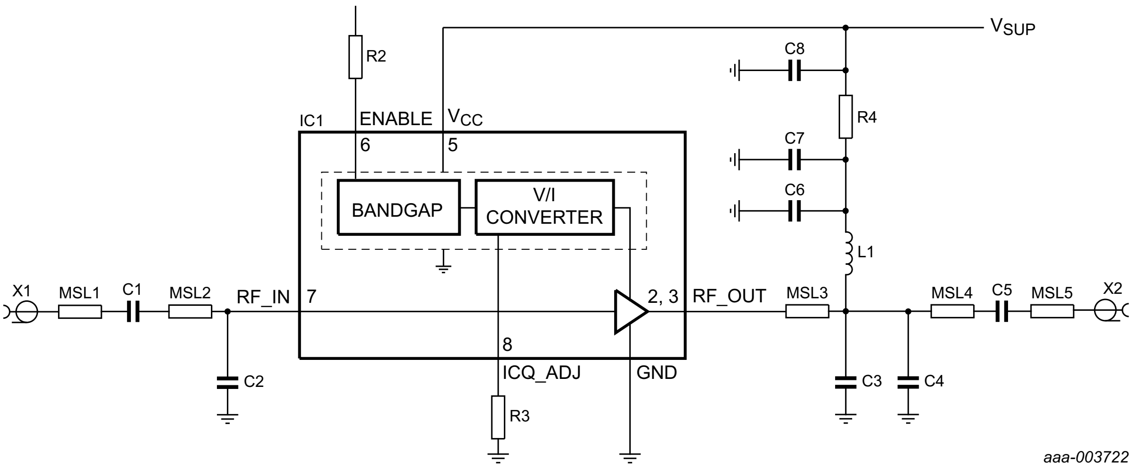
Customer evaluation boards are available from NXP (see Section 6 “Ordering information”). The BGA7130 shall be decoupled and matched as depicted in Figure 5. The ground leads and exposed paddle should be connected directly to the ground plane. Enough via holes should be provided to connect top and bottom ground planes in the final application board. Sufficient cooling should be provided preventing the temperature of the exposed die pad from exceeding 85 °C.

The LTE-750 and UMTS-2140 application boards differ in input and output matching topology have the same input and output matching topology.



See Table 12 for list of components.

Fig 5. Application diagram of customer evaluation board for LTE-750 application



See Table 12 for list of components.

Fig 6. Application diagram of customer evaluation board for UMTS-2140 application

The Printed-Circuit Board (PCB) is a four metal layer substrate board as described in Figure 7. The width and the gap between the strip-line and ground plane are configured such that a 50 ohm transmission line is obtained.

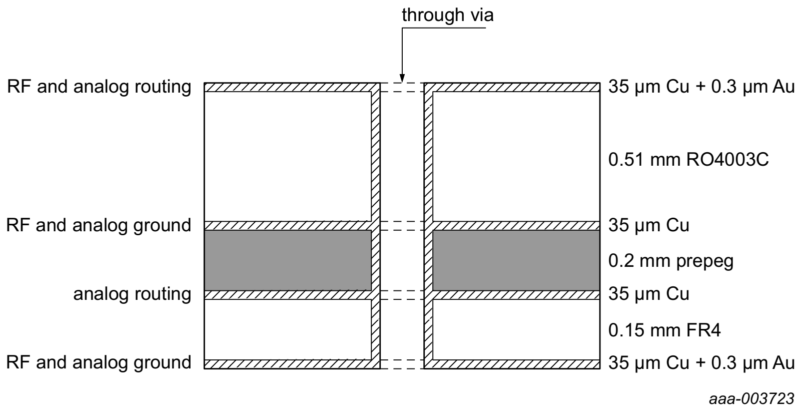


Fig 7. Printed-Circuit Board (PCB) stack build

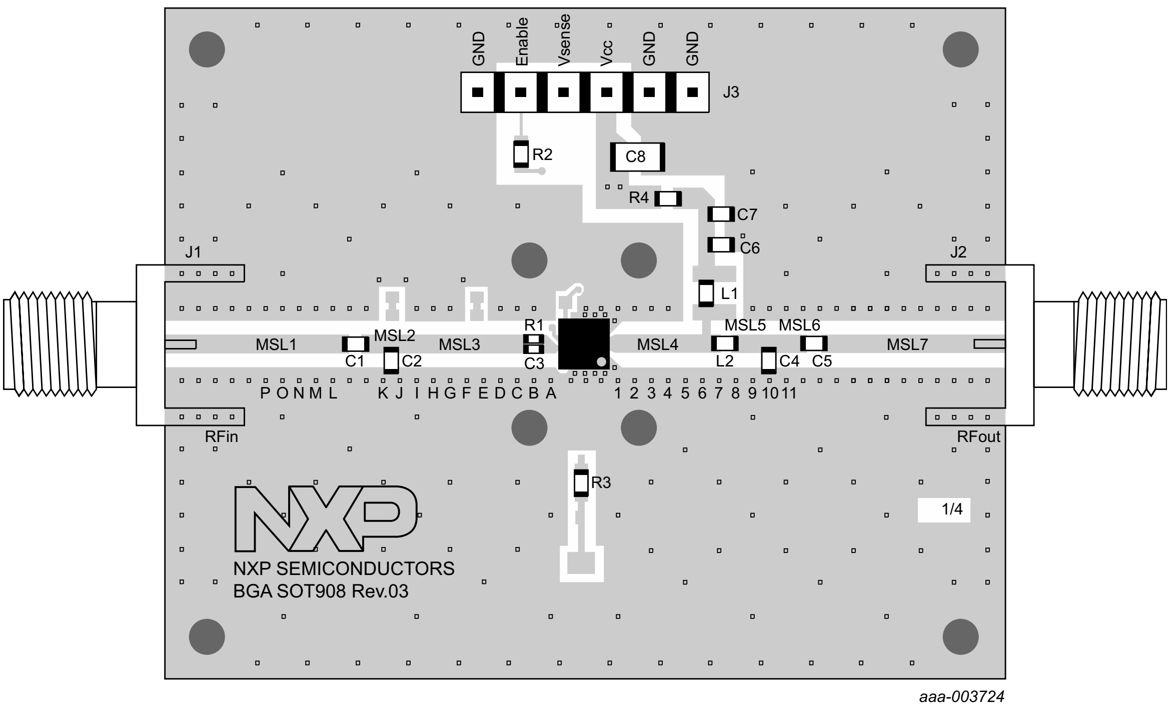


Fig 8. Top view of populated LTE-750 Printed-Circuit Board (PCB)

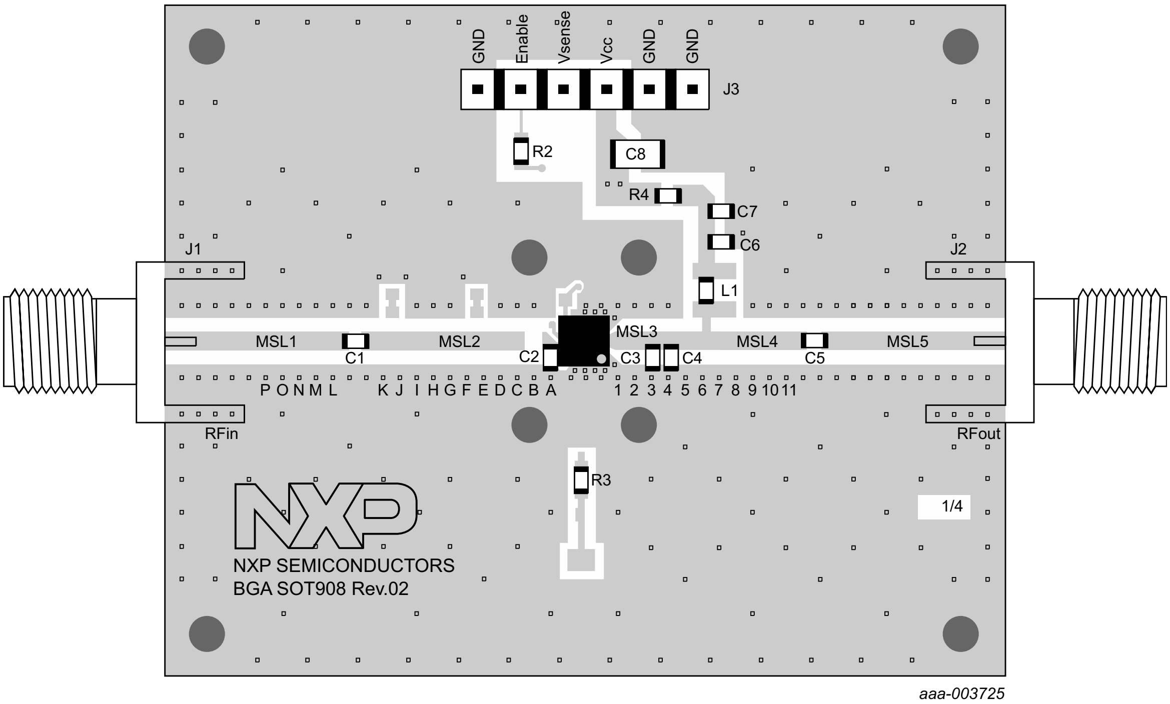


Fig 9. Top view of populated LTE-2140 Printed-Circuit Board (PCB)

Table 12. List of components

See Figure 5 for schematics.

Component	Description	Value			Remarks
		LTE-750	UMTS-2140		
C1, C5	capacitor	47 pF	15 pF		
C2	capacitor	12 pF	3.3 pF		
C3	capacitor	47 pF	0.82 pF		
C4	capacitor	10 pF	2.2 pF		
C6	capacitor	1 nF	10 nF		
C7	capacitor	100 nF	1 μF		
C8	capacitor	10 μF	10 μF		
IC1	BGA7130	-	-		NXP
MSL1	micro stripline	10.95 mm	10.95 mm	[1]	
MSL2	micro stripline	1.5 mm	11.2 mm	[1]	
MSL3	micro stripline	8.0 mm	3.3 mm	[1]	
MSL4	micro stripline	6.3 mm	8.6 mm	[1]	
MSL5	micro stripline	1.9 mm	10.95 mm	[1]	
MSL6	micro stripline	2.0 mm	-	[1]	
MSL7	micro stripline	10.95 mm	-	[1]	
R1	resistor	47 Ω	-		
R2	resistor	240 Ω	240 Ω		
R3	resistor	523 Ω	523 Ω		

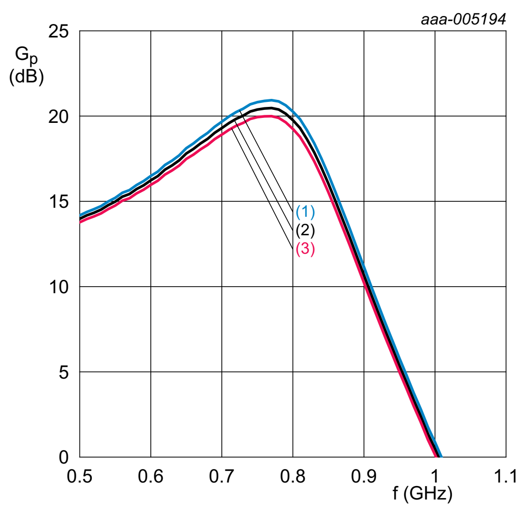
Table 12. List of components *...continued*

See Figure 5 for schematics.

Component	Description	Value			Remarks
		LTE-750	UMTS-2140		
R4	resistor	0 Ω	0 Ω		
L1	RF choke	68 nH	18 nH		
L2	inductor	1.5 nH	-		
X1, X2	SMA connector	-	-		

[1] length (L) is specified, width (W) = 1.14 mm and spacing (S) = 0.8 mm.

14.2 Characteristics LTE-750



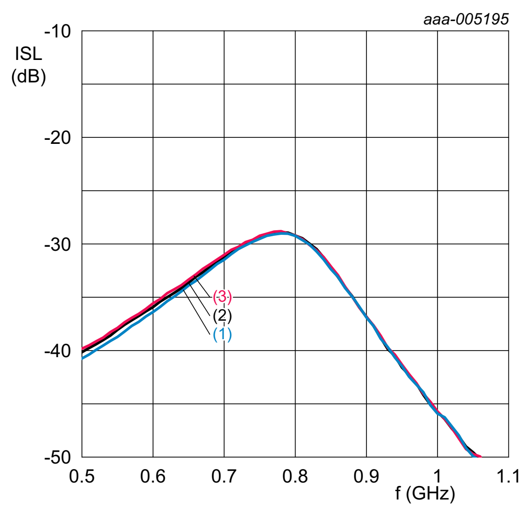
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 10. Power gain as a function of frequency for LTE-750 application; typical values



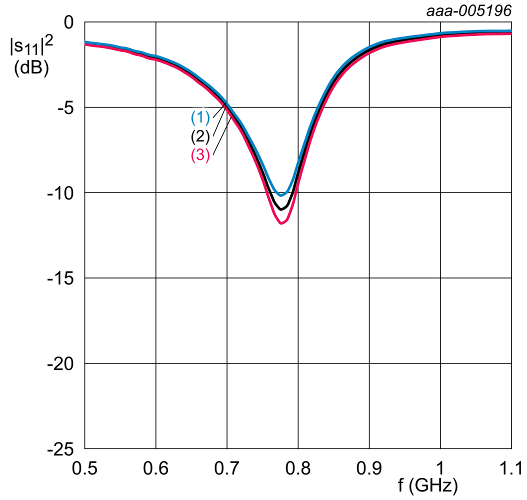
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 11. Isolation as a function of frequency for LTE-750 application; typical values



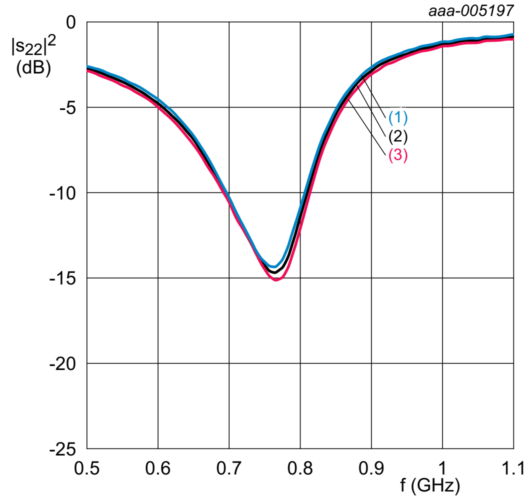
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 12. Input return loss as a function of frequency for LTE-750 application; typical values



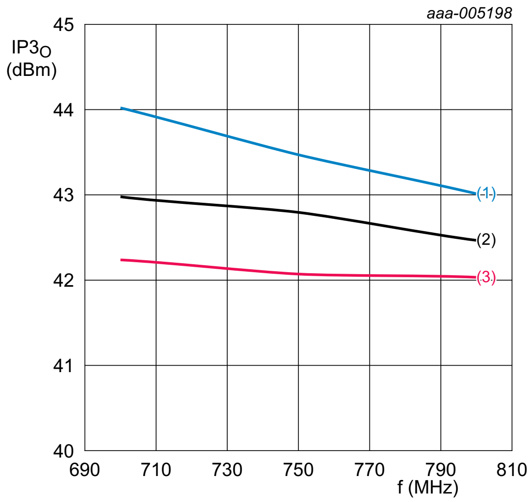
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 13. Output return loss as a function of frequency for LTE-750 application; typical values



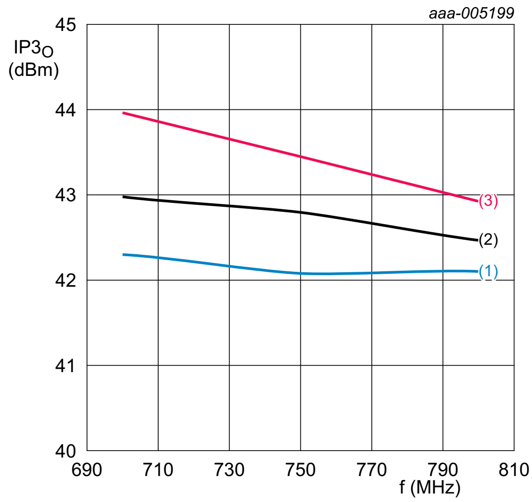
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; P_L = 19 dBm per tone; f = 748 MHz; Δf = 1 MHz; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 14. Output third order intercept point as a function of frequency for LTE-750 application; different temperatures; typical values



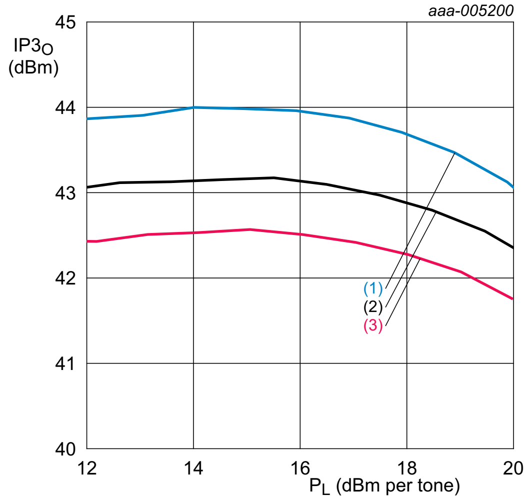
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; P_L = 19 dBm per tone; f = 748 MHz; Δf = 1 MHz; matched for LTE-750.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

(3) V_{SUP} = 5.25 V

Fig 15. Output third order intercept point as a function of frequency for LTE-750 application; different supply voltages; typical values



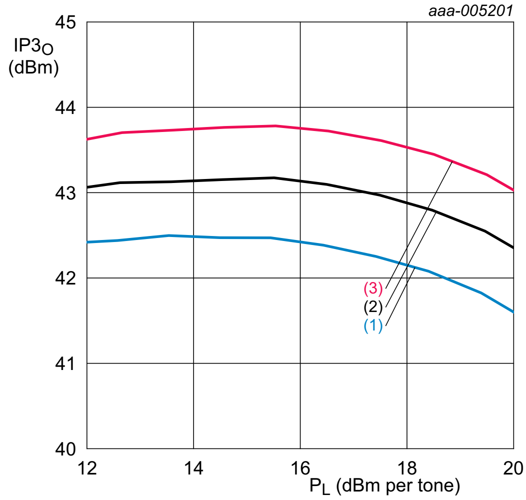
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; f = 748 MHz; Δf = 1 MHz; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 16. Output third order intercept point as a function of output power for LTE-750 application; different temperatures; typical values



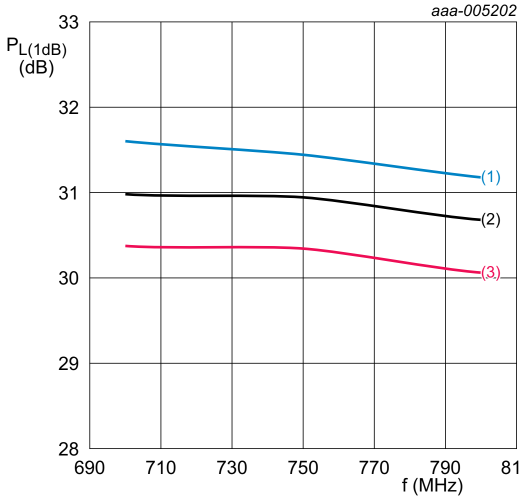
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; f = 748 MHz; Δf = 1 MHz; matched for LTE-750.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

(3) V_{SUP} = 5.25 V

Fig 17. Output third order intercept point as a function of output power for LTE-750 application; different supply voltages; typical values



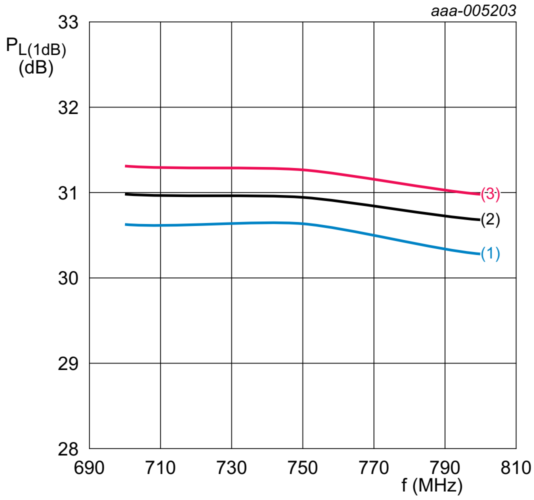
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 18. Output power at 1 dB gain compression as a function of frequency for LTE-750 application; different temperatures; typical values



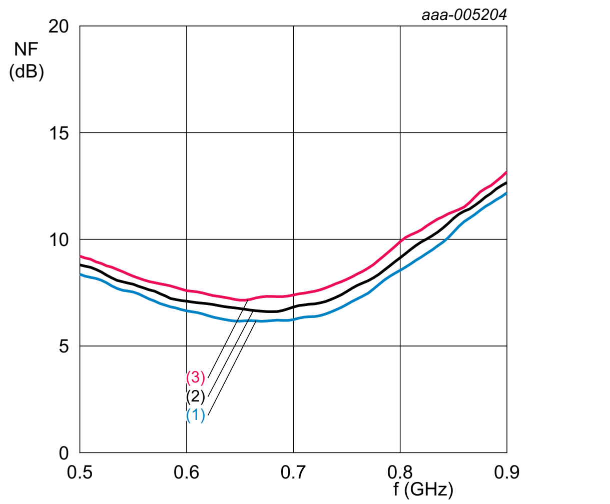
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

(3) V_{SUP} = 5.25 V

Fig 19. Output power at 1 dB gain compression as a function of frequency for LTE-750 application; different supply voltages; typical values



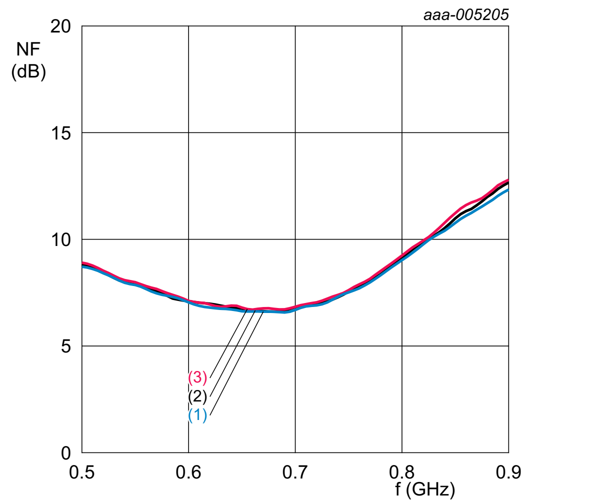
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 20. Noise figure as a function of frequency for LTE-750 application; different temperatures; typical values



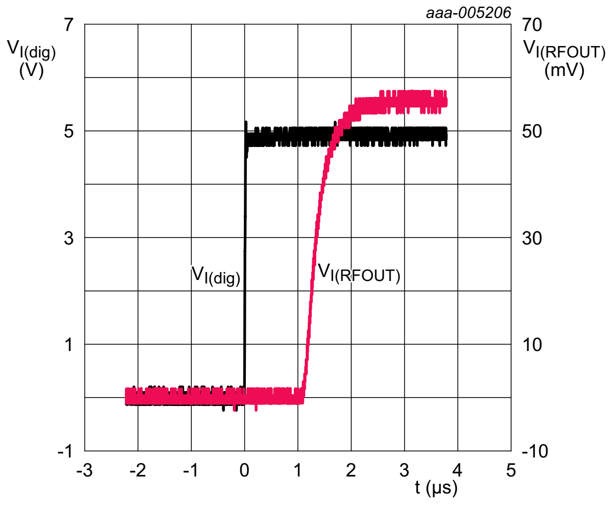
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

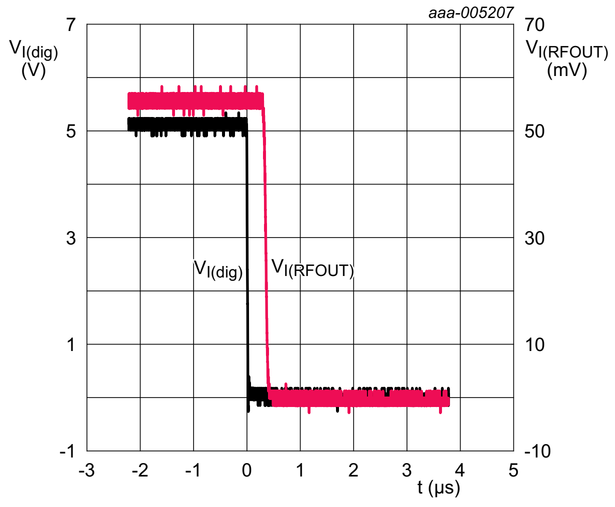
(3) V_{SUP} = 5.25 V

Fig 21. Noise figure as a function of frequency for LTE-750 application; different supply voltages; typical values



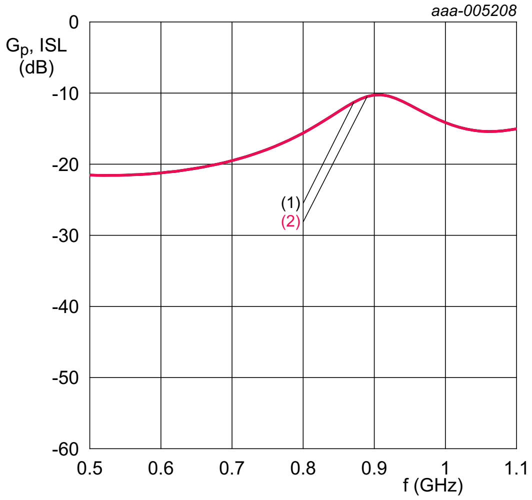
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

Fig 22. Power-on delay time; typical values



V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for LTE-750.

Fig 23. Power-down delay time; typical values

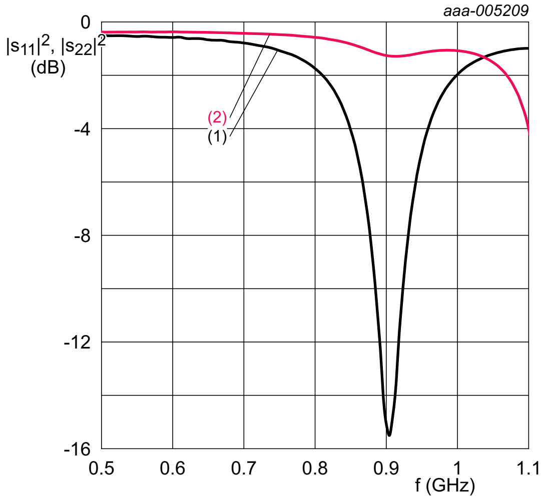


V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; pin ENABLE = LOW; matched for LTE-750.

(1) G_p

(2) ISL

Fig 24. Isolation in power-down mode; typical values



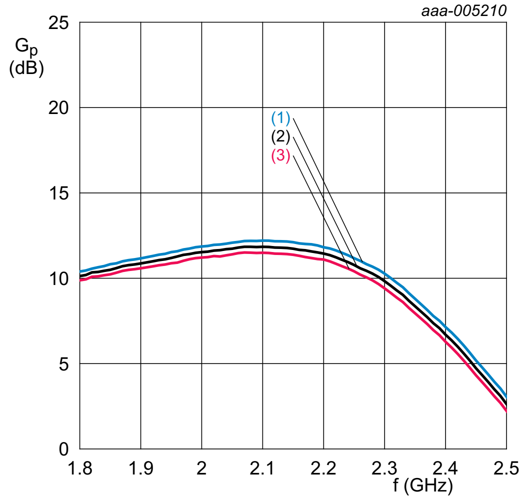
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; pin ENABLE = LOW; matched for LTE-750.

(1) $|s_{11}|^2$

(2) $|s_{22}|^2$

Fig 25. Return loss in power-down mode; typical values

14.3 Characteristics UMTS-2140



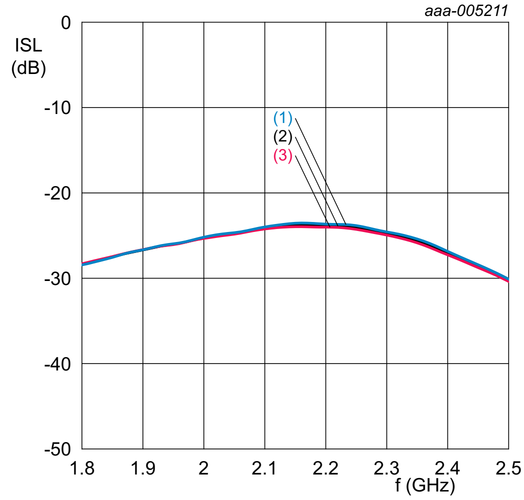
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 26. Power gain as a function of frequency for UMTS-2140 application; typical values



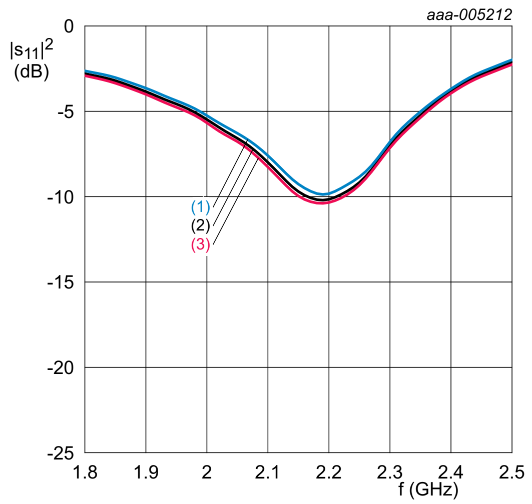
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 27. Isolation as a function of frequency for UMTS-2140 application; typical values



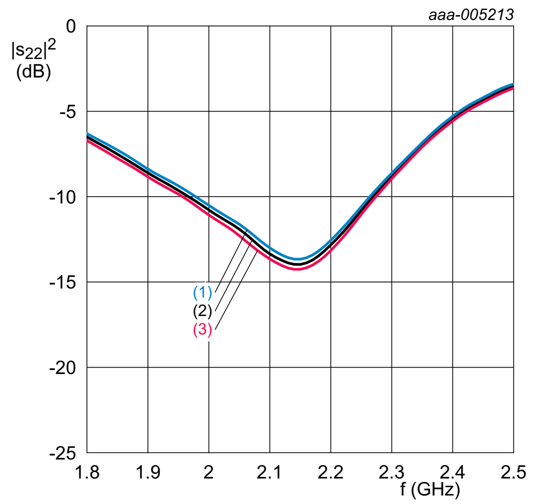
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 28. Input return loss as a function of frequency for UMTS-2140 application; typical values



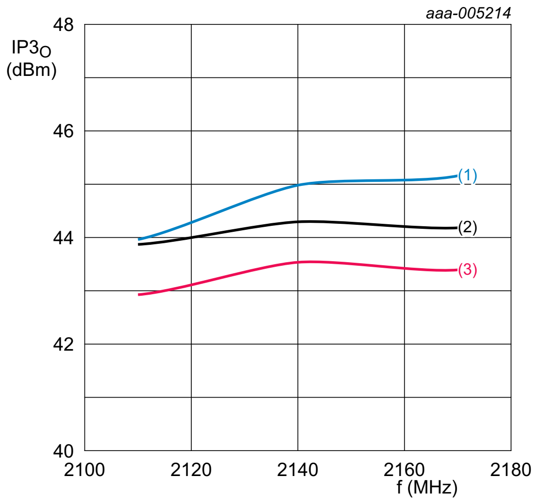
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 29. Output return loss as a function of frequency for UMTS-2140 application; typical values



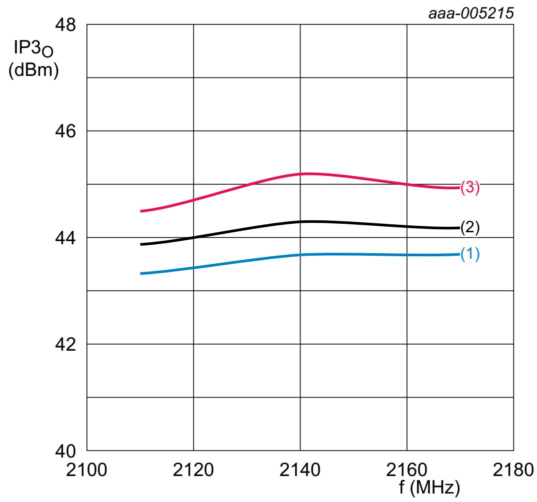
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; P_L = 15 dBm per tone; Δf = 1 MHz; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 30. Third order intermodulation distortion as a function of frequency for UMTS-2140 application; different temperatures; typical values



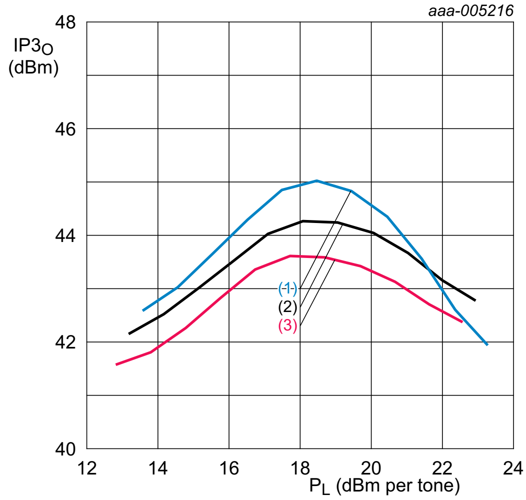
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; P_L = 15 dBm per tone; Δf = 1 MHz; matched for UMTS-2140.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

(3) V_{SUP} = 5.25 V

Fig 31. Third order intermodulation distortion as a function of frequency for UMTS-2140 application; different supply voltages; typical values



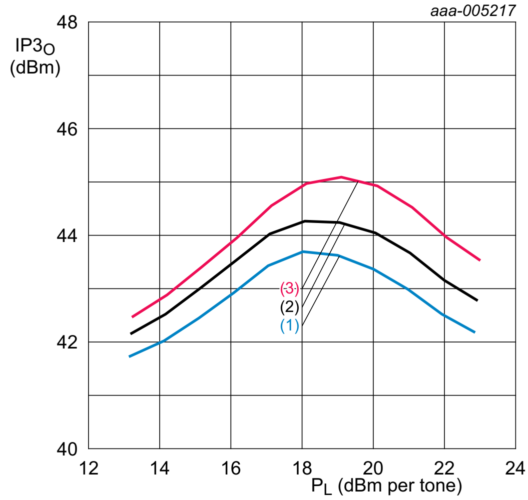
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; Δf = 1 MHz; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 32. Third order intermodulation distortion as a function of output power for UMTS-2140 application; different temperatures; typical values



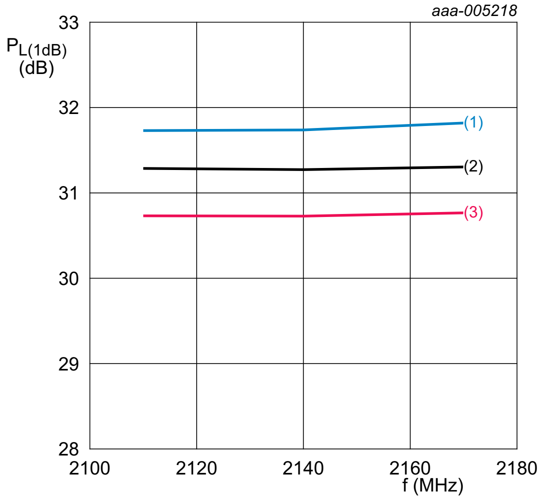
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; Δf = 1 MHz; matched for UMTS-2140.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

(3) V_{SUP} = 5.25 V

Fig 33. Third order intermodulation distortion as a function of output power for UMTS-2140 application; different supply voltages; typical values



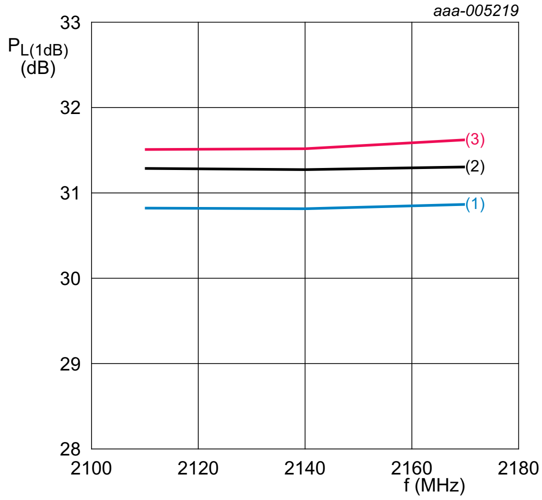
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 34. Output power at 1 dB gain compression as a function of frequency for UMTS-2140 application; different temperatures; typical values



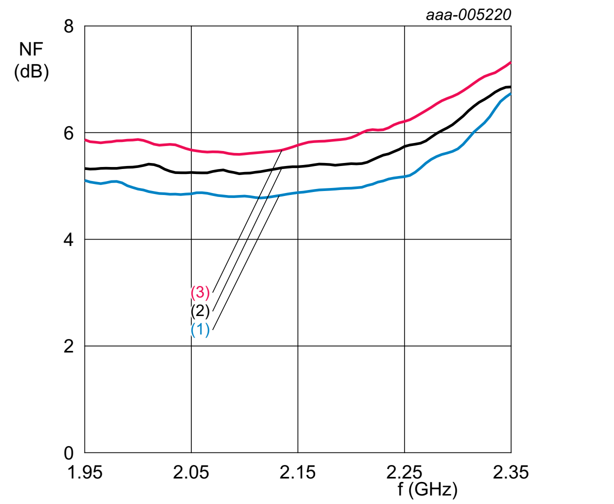
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

(3) V_{SUP} = 5.25 V

Fig 35. Output power at 1 dB gain compression as a function of frequency for UMTS-2140 application; different supply voltages; typical values



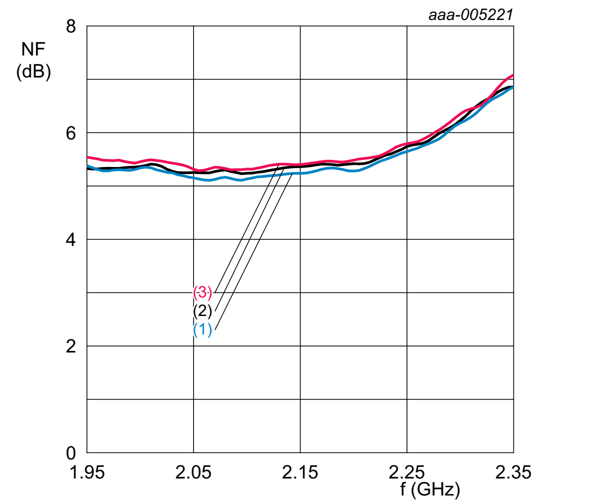
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) T_{amb} = −40 °C

(2) T_{amb} = +25 °C

(3) T_{amb} = +85 °C

Fig 36. Noise figure as a function of frequency for UMTS-2140 application; different temperatures; typical values



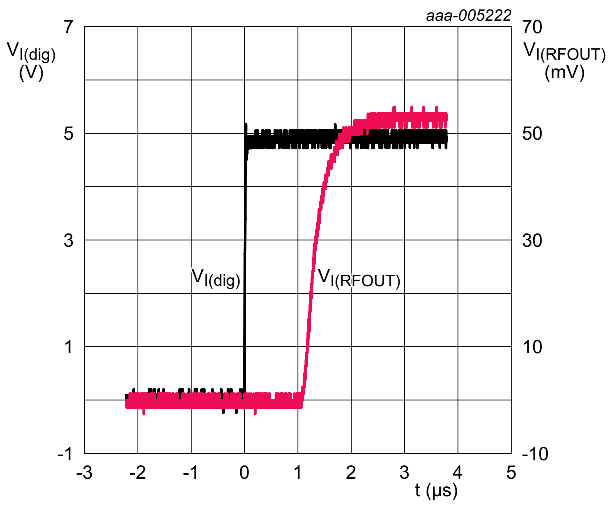
T_{amb} = 25 °C; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

(1) V_{SUP} = 4.75 V

(2) V_{SUP} = 5 V

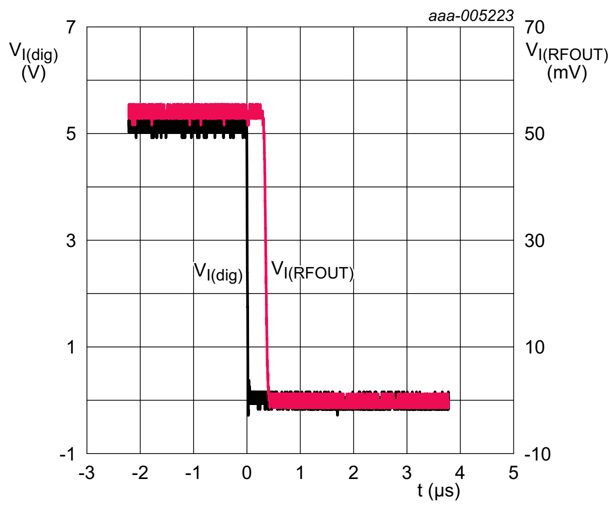
(3) V_{SUP} = 5.25 V

Fig 37. Noise figure as a function of frequency for UMTS-2140 application; different supply voltages; typical values



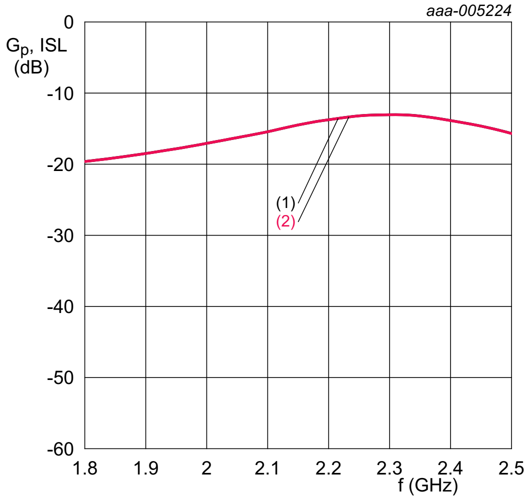
V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

Fig 38. Power-on delay time; typical values



V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; matched for UMTS-2140.

Fig 39. Power-down delay time; typical values

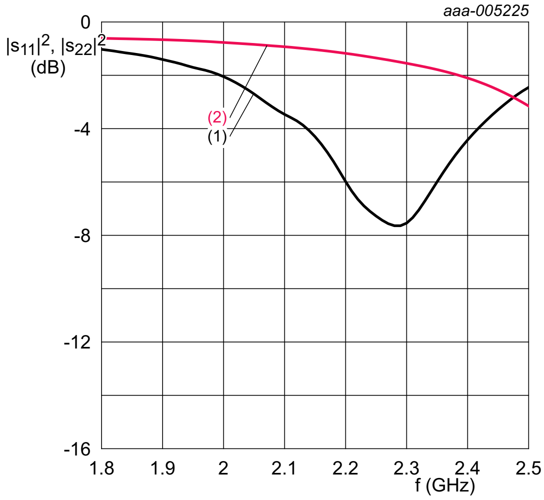


V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; pin ENABLE = LOW; matched for UMTS-2140.

(1) G_p

(2) ISL

Fig 40. Isolation in power-down mode; typical values



V_{SUP} = 5 V; $I_{CC(tot)}$ = 450 mA; pin ENABLE = LOW; matched for UMTS-2140.

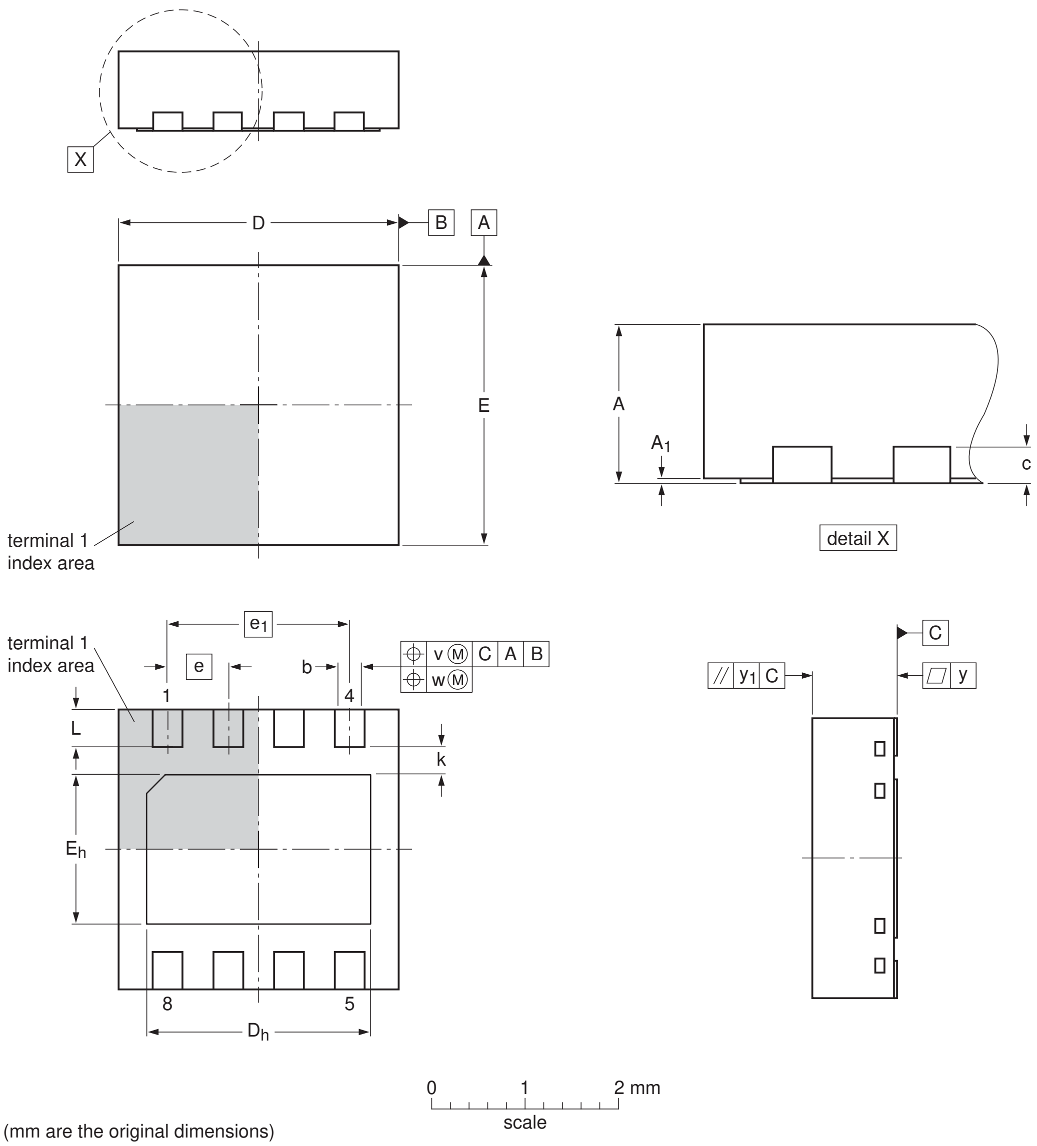
(1) $|s_{11}|^2$

(2) $|s_{22}|^2$

Fig 41. Return loss in power-down mode; typical values

15. Package outline

HVSON8: plastic thermal enhanced very thin small outline package; no leads; 8 terminals; body 3 x 3 x 0.85 mm **SOT908-3**



Dimensions (mm are the original dimensions)

Unit		A(1)	A_1	b	c	D(1)	D_h	E(1)	E_h	e	e_1	k	L	v	w	y	y_1
	max	1.00	0.05	0.30		3.1	2.45	3.1	1.75			0.30	0.45				
mm	nom	0.85	0.03	0.25	0.2	3.0	2.40	3.0	1.70	0.5	1.5	0.25	0.40	0.1	0.05	0.05	0.1
	min	0.80	0.00	0.20		2.9	2.35	2.9	1.65			0.20	0.35				

Note

1. Plastic or metal protrusions of 0.075 mm maximum per side are not included.

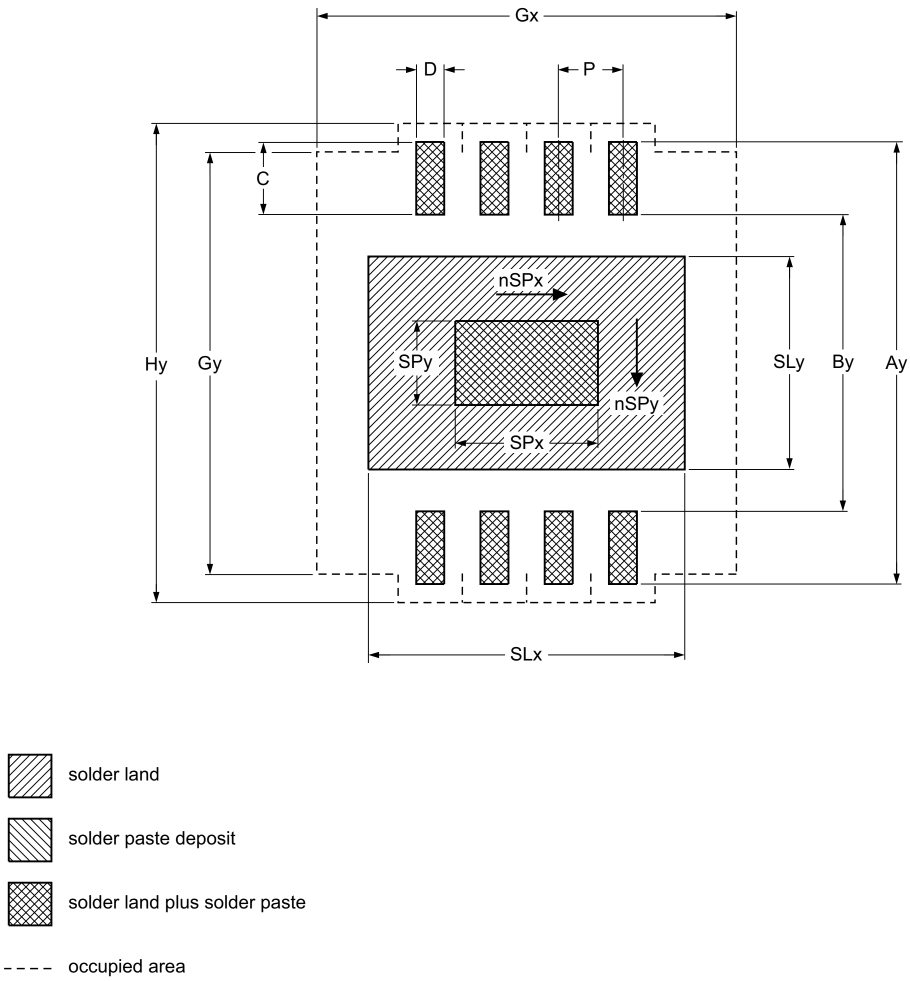
sot908-3_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT908-3	- - -	MO-229	- - -			~~11-12-18~~ 12-06-18

Fig 42. Package outline SOT908-3 (HVSON8)

16. Soldering

Footprint information for reflow soldering of HVSON8 package **SOT908-3**



DIMENSIONS in mm

P	Ay	By	C	D	SLx	SLy	SPx	SPy	Gx	Gy	Hy	nSPx	nSPy
0.5	3.45	2.25	0.6	0.25	2.45	1.65	1.1	0.65	3.25	3.25	3.7	1	1

Issue date ~~12-07-03~~ 12-07-12

sot908-3_fr

Fig 43. Reflow soldering footprint

17. Abbreviations

Table 13. Abbreviations

Acronym	Description
CDM	Charged Device Model
CPE	Customer-Premises Equipment
ESD	ElectroStatic Discharge
E-UTRA	Evolved Universal Terrestrial Radio Access
eUTRAN	evolved UMTS Terrestrial Radio Access Network
HBM	Human Body Model
ISM	Industrial, Scientific and Medical
LTE	Long Term Evolution
MMIC	Monolithic Microwave Integrated Circuit
MoCA	Multimedia over Coax Alliance
PAR	Peak-to-Average power Ratio
RFID	Radio Frequency IDentification
SMA	Sub-Miniature version A
UMTS	Universal Mobile Telecommunications System
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access
WLAN	Wireless Local Area Network

18. Revision history

Table 14. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BGA7130 v.1	20121009	Product data sheet	-	-

19. Legal information

19.1 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.
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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