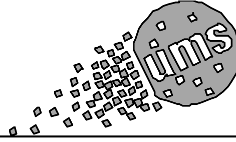

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20-25GHz LNA

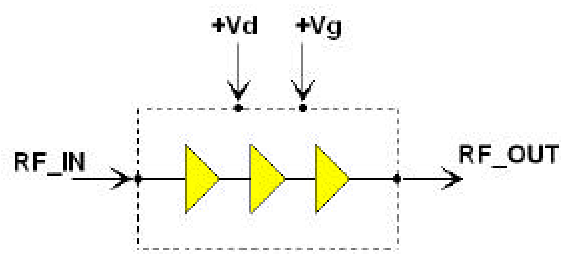
GaAs Monolithic Microwave IC
In QFN package

Description

The CHA2411 is a monolithic Low noise Amplifier in K band providing 26 dB gain from a single bias supply +5V with a noise figure of 2.5 dB. All the active devices are self biased on chip.

The circuit is manufactured with a standard GaAs PHEMT process: 0.25µm gate length, via holes through the substrate, air bridges and electron beam gate lithography.

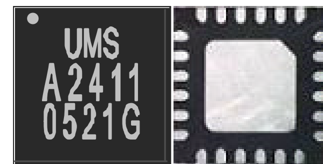
The chip is delivered in a 24 Leads RoHS compliant QFN4x4 package.



Functional diagram

Main Features

- Excellent noise figure : 2.5 dB
- Stable gain vs temperature 26 ± 2dB
- Single supply : +5V
- Devices self biased on chip
- Standard SMD package : QFN 24L 4x4



Plastic Package

Main Characteristics in QFN package

Tamb = +25°C

Parameters	Min	Typ	Max	Unit
Frequency range	20		25	GHz
Small signal Gain	22	26	30	dB
SSB Noise figure		2.5		dB
Input / Output Return Loss		15		dB

ESD Protection : Electrostatic discharge sensitive device. Observe handling precautions !

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Electrical Characteristics

Full temperature range

Symbol/Pins	Parameters	Min	Typ	Max	Unit
	Frequency range	20		25	GHz
	Small signal Gain	22	26	30	dB
	Gain variation over frequency		± 0.5		dB
	Gain variation over temperature		± 2		dB
	SSB Noise figure		2.5		dB
	Input / Output Return Loss (20 to 23GHz)		15		dB
	Input Power at 1 dB Gain Compression @24GHz		-14		dBm
	Input IP3 @24GHz		-7.5		dBm
	Saturated Output Power @24GHz		13.5	15	dBm
+Vd, +Vg	Supply Voltage		5		V
+I	Supply Current		43	55	mA
Top	Operating temperature range	-40	25	100	°C

Remark :
These performance has been obtained with the chip in QFN package mounted on the recommended boards (ref. 95541 & 95581) described in the document. These performance are highly dependent on this environment.

Absolute Maximum Ratings (1)

Symbol	Parameters	Values	Unit
+Vg, +Vd	Maximum positive supply voltage	6	V
+I	Maximum positive supply voltage	65	mA
Pin	Maximum peak input power overdrive	-5	dBm
Top	Operating temperature range (2)	-40 to +100	°C
Tstg	Storage temperature range	-55 to +125	°C

(1) Operation of this device above anyone of these parameters may cause permanent damage. Duration < 1s
(2) Temperature of the back side of the QFN. Thermal resistance is RTh=195°C/W

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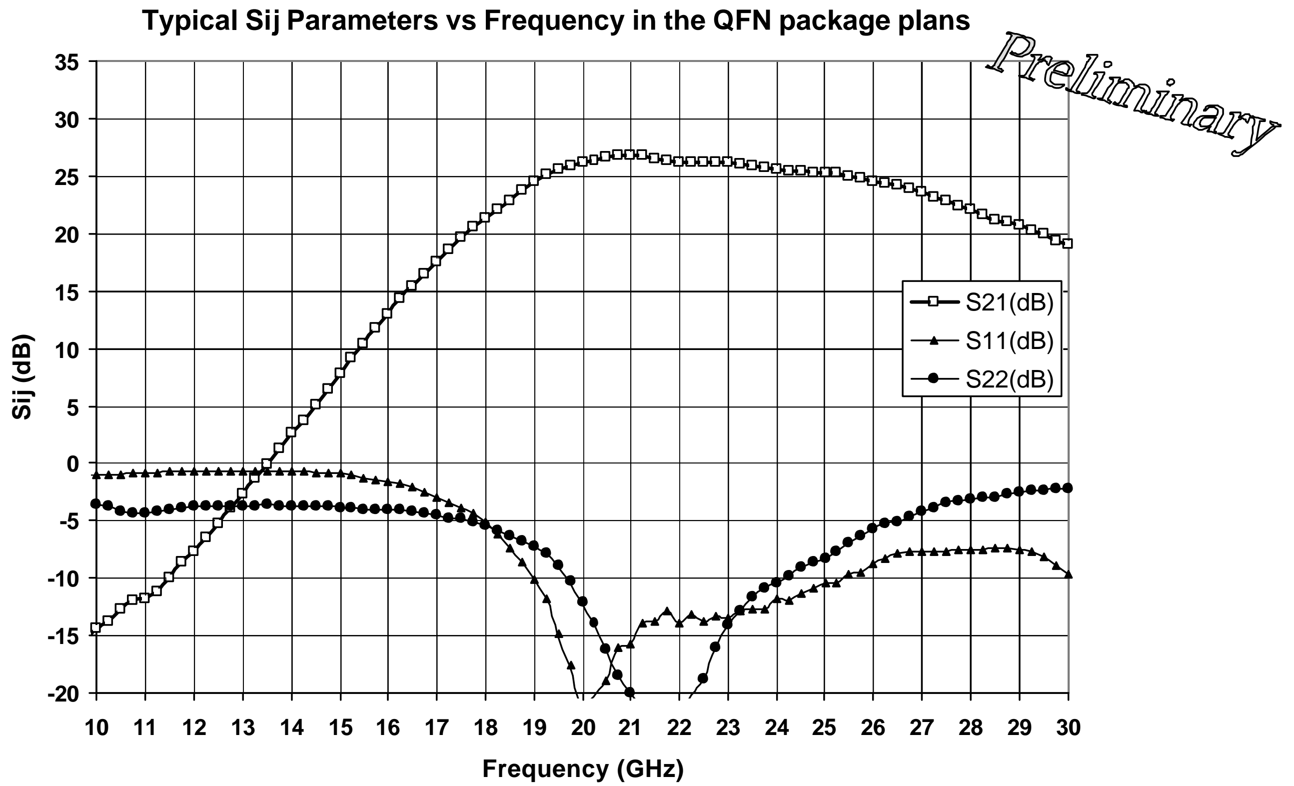
Typical QFN measurements on board 95581 (QFN plan)



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Typical QFN measurements on board 95541 (QFN plan)

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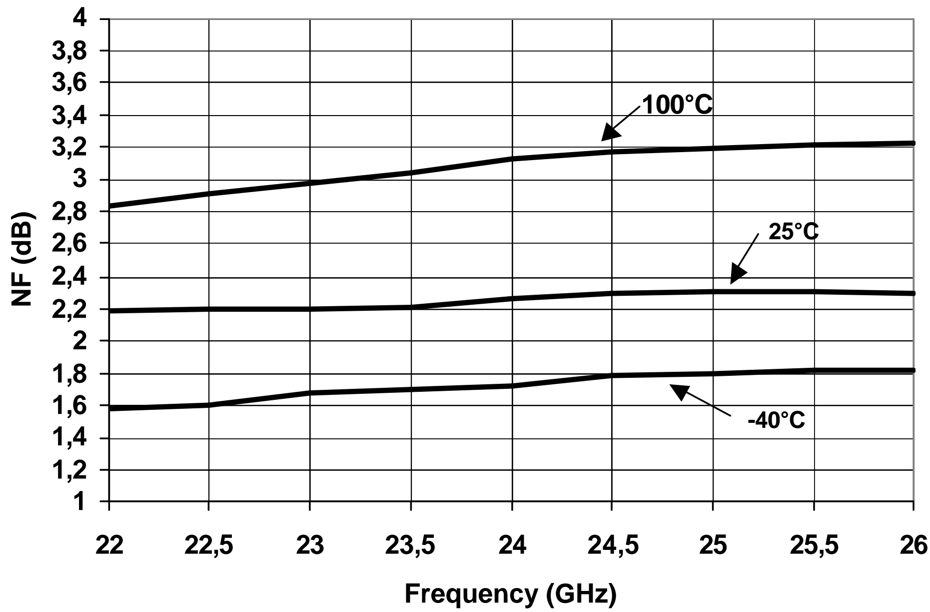

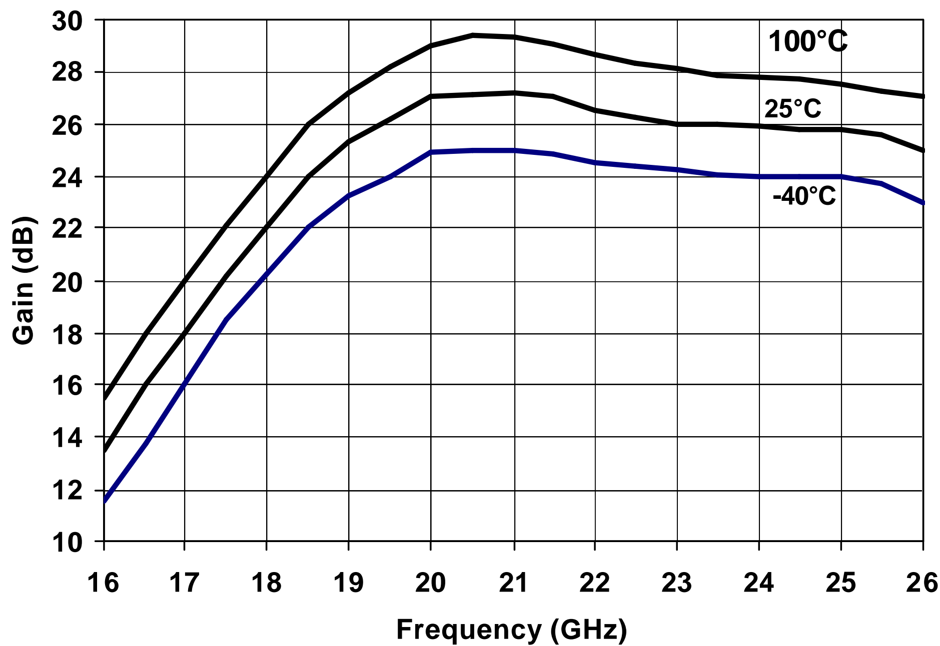

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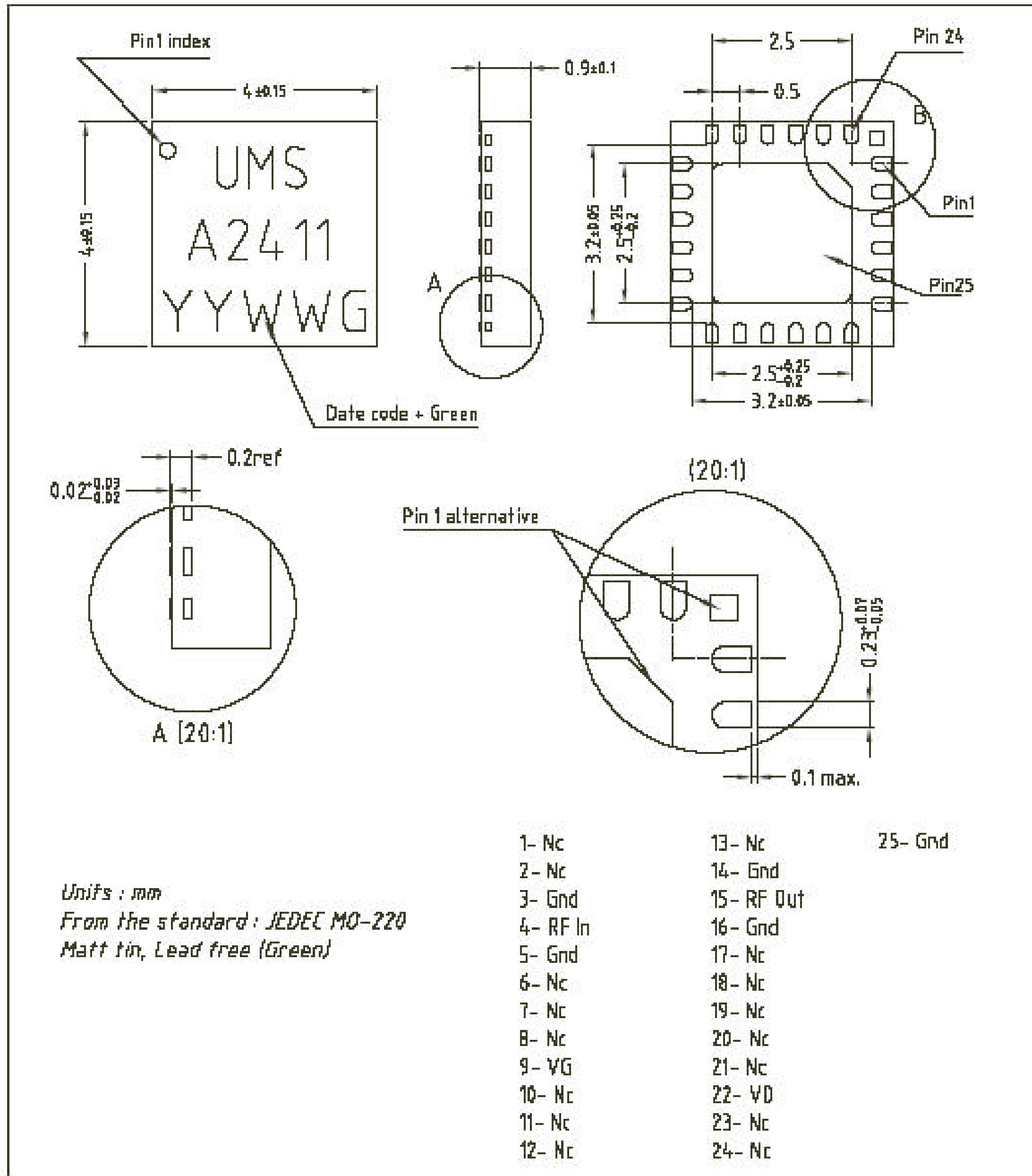
QFN Outline



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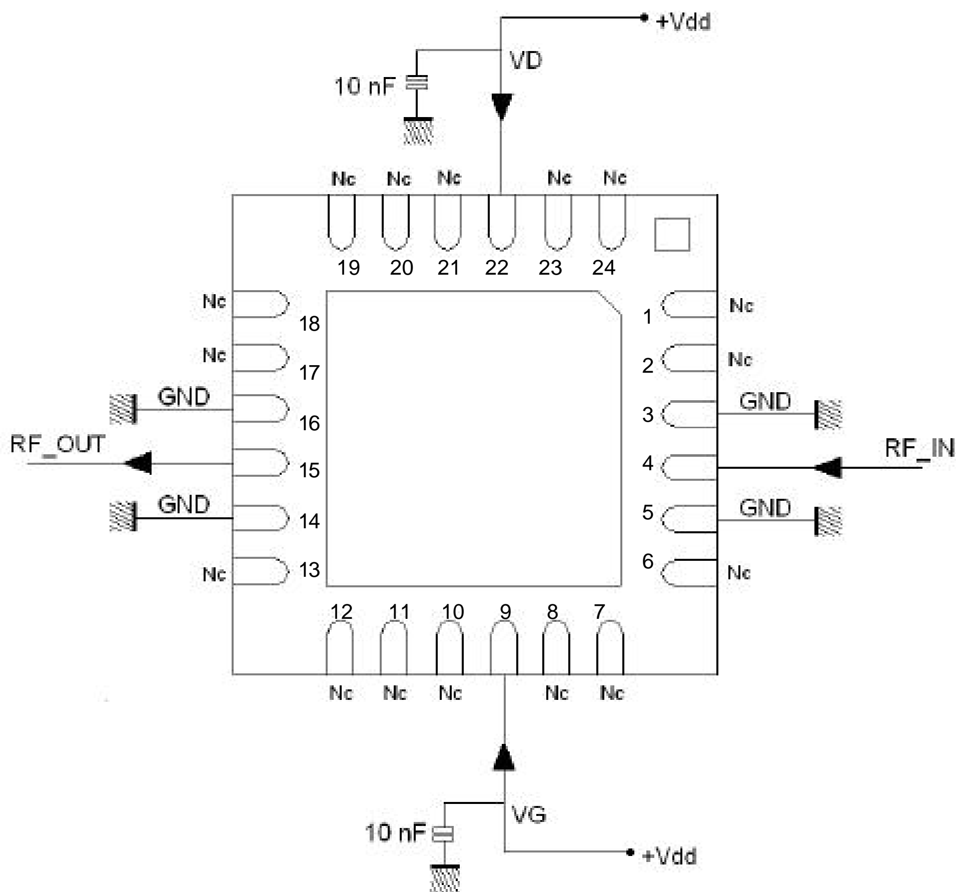
Pin-out description

Pin number	Pin name	Symbol Name	Description
4	RFIn	RF_IN	Control Voltage port
15	RFOut	RF_OUT	RF1 Input/Output ports
22	VD	+Vd	Positive Drain supply voltage
9	VG	+Vg	Positive Gate supply voltage
3, 5, 14, 16	GND		Ground
1, 2, 6, 7, 8, 10, 11, 12, 13, 17, 18, 19, 20, 21, 23, 24	Nc		Not connected

External Components and bias configuration (recommended)



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Recommended Test Fixture (Ref. 95541) for measurements over Temperature Range

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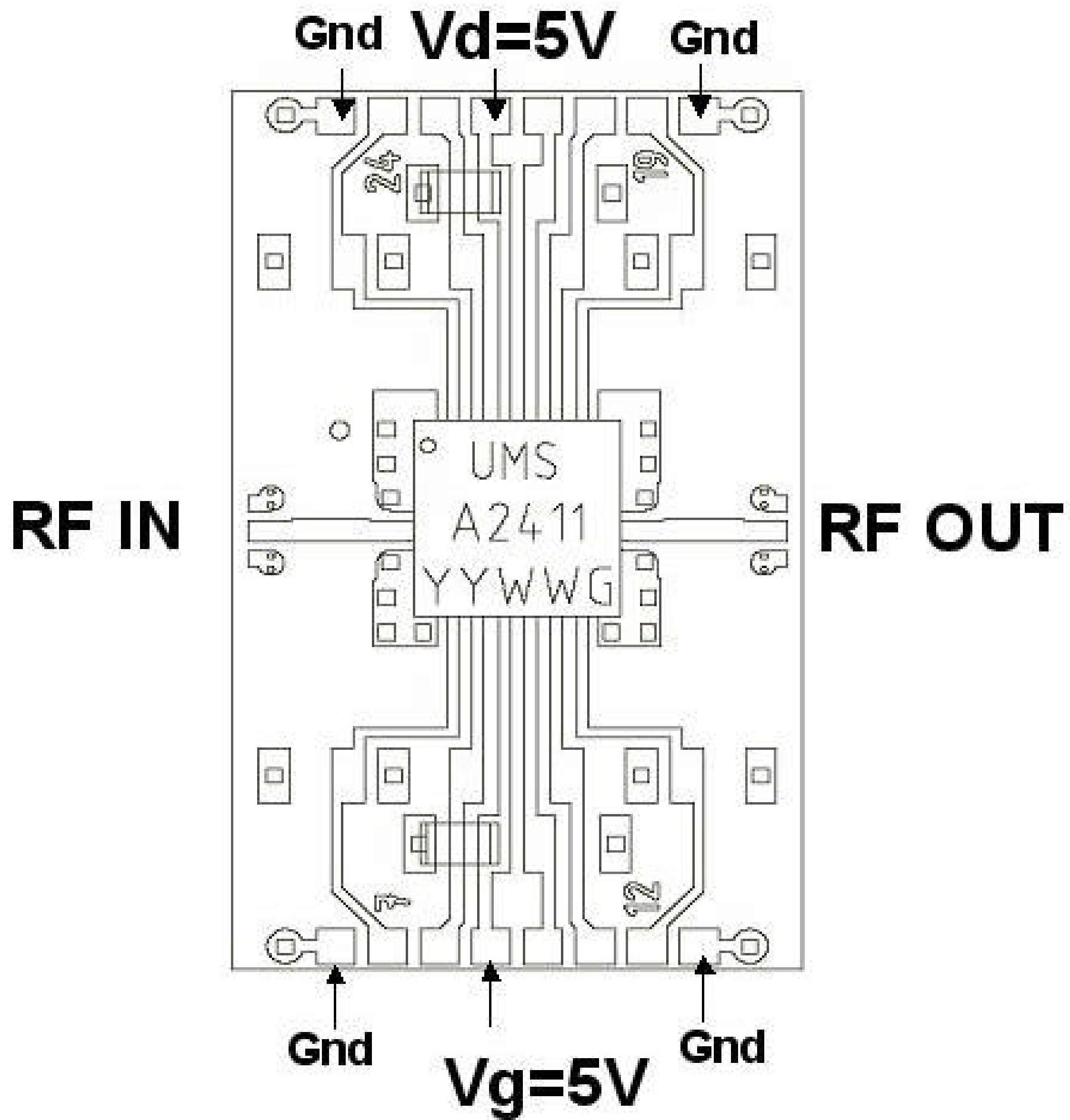
Recommended Test Fixture (Ref. 95581) for measurements in the package's plans with probes



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ESD sensitivity

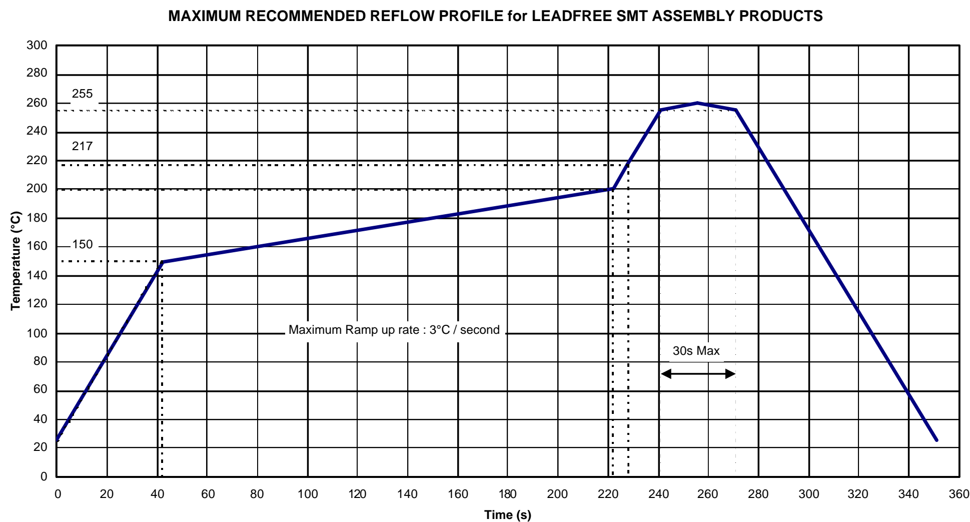
Norm	Value
MIL-STD-1686C	HBM Class 1 (<1000V)
ESD STM5.1-1998	HBM Class 0 (<250V)

Package Information

Parameter	
Package body material	RoHS-compliant Low stress Injection Molded Plastic
Lead finish	100% matte Sn
MSL Rating	MSL1

Recommended surface mount package assembly (see UMS AN0017)

For volume production the SMD type package can be treated as a standard surface mount component (please refer to the IPC/JEDEC J-STD-020C standard or equivalent). The assembly on the motherboard can be performed using a standard assembly process (e.g. stencil solder printing, standard pick-and-place machinery, and solder reflow oven). However, caution should be taken to perform a good and reliable contact over the whole pad area.



Attention:

The solder thickness after reflow should be typical 50µm [2 mils] and the lateral alignment between the package and the motherboard should be within 50µm [2 mils].

It is important for the performance of the product that the whole overlapping area between the motherboard and package pads is connected. Voids or other improper connections, in particular, between the ground pads on motherboard and package will lead to a deterioration of the RF performance and the heat dissipation. The latter effect can reduce drastically reliability and lifetime of the product.

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Ordering Information

24L-QFN4x4 Lead Free Package : CHA2411-QDG/XY

Stick: XY=20 Tape and reel: XY=21

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