

# PRELIMINARY DATASHEET

## CGY2108GS/C1/F1

**High Gain Low Noise High IP3 Amplifier**

### DESCRIPTION

The CGY2108GS is using the CGY2108UH die which is an extremely Low Noise cascode Amplifier with state of the art Noise Figure and Linearity suitable for applications from 500 MHz to 6000 MHz.

The CGY2108GS consists of a single amplifier chain and is ideal for use in a balanced configuration as well as a single ended amplifier.

The minimum Noise Figure of the CGY2108UH die itself is below **0.32 dB** at **1.9 GHz**.

The MMIC is manufactured using OMMIC's qualified 0.25  $\mu\text{m}$  PHEMT GaAs MMIC technology.

The device is available in a ceramic space grade hermetic package STRATEDGE G1616M-7F.

### APPLICATIONS

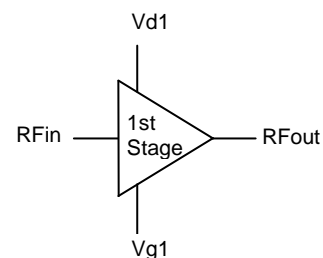
- ⤴ High performance high reliability LNA in the 0.5–6 GHz frequency band
- ⤴ Space models
- ⤴ Base Station applications (LTE, GSM, CDMA, WCDMA, TD-SCDMA, CDMA2000, WiMAX, etc)
- ⤴ Tower mounted amplifiers
- ⤴ Repeaters

### FEATURES

central frequency (GHz)	NF (dB)	Gain (dB)	OIP3 (dBm)	P1dB (dBm)
0,9	0,6	23	36,5	-
1,9	0,65	20	-	-
1.9 in dual mode	0,5	21,5	32,5	22
3.2 in SE conf.	0,8	17,5	29	

(\*) measured figures including noise contribution of couplers, connectors and biasing circuitry

- ⤴ Usable frequency range 0,5 to 6000 MHz
- ⤴ Uses a highly reliable PHEMT MMIC process
- ⤴ Delivered as 100 % RF tested devices
- ⤴ Samples and Demonstration Boards Available
- ⤴ Space and MIL-STD Available



CGY2108GS block diagram



## LIMITING VALUES

$T_{amb} = +23\text{ °C}$ , at Ceramique package lead; unless other wise specified.

Symbol	Parameter	Conditions	MIN.	MAX.	UNIT
$V_{EE1}$	Gate voltage	$V_{DD}$ open-circuited	-3	+ 1	V
$V_{DD1}$	Drain voltage	$V_{EE}$ open-circuited	-3	+ 10	V
$I_{D1}$	Drain current			70	mA
$P_{IN}$	Input power			10	dBm
$T_{amb}$	Ambient temperature		-40	+85	°C
$T_j$	Junction temperature			+150	°C
$T_{stg}$	Storage temperature		-55	+150	°C

## THERMAL CHARACTERISTICS

Symbol	Parameter	Value	UNIT
$R_{th(j-a)}$	Thermal resistance from junction to ambient ( $T_a = 25\text{ °C}$ )	70	°C/W

## CHARACTERISTICS

$T_{amb} = +23\text{ °C}$

Symbol	Parameter	Conditions	MIN.	TYP.	MAX.	UNIT
$f_i$	Input frequency		0.5		6	GHz
<i>Performance at ceramique package lead; <math>f_i = 1.9\text{ GHz}</math></i>						
$V_D$	Supply voltage			4		V
$I_D$	Supply current	$V_{EE} = -0.55\text{ V}$		50		mA
G	Gain			22		dB
$NF_{min}$	Minimum Noise Figure			0.32		dB
<i>Performance * of Reference Board (Single Ended configuration with on-board bias resistors); <math>f_i = 1.95\text{ GHz}</math></i>						
$V_{DD}$	Supply voltage			5		V
$I_D$	Supply current	$V_{EE1} = V_{EE2} = -0.55\text{ V}$		50		mA
G	Gain			22		dB
NF	Noise Figure			0.5		dB
$ISO_{rev}$	Reverse Isolation	OUT/IN		32		dB
IIP3	Input third order intercept point	$I_D = 70\text{ mA}$	3.5	8,3		dBm
$S_{11}$	Input reflection coefficient	50 $\Omega$ source		-10		dB
$S_{22}$	Output reflection coefficient	50 $\Omega$ load		-10		dB
$ISO_{IN1-IN2}$	Isolation between IN1 and IN2	IN1/IN2		30		dB
<i>Performance * of Demonstration Board (Balanced configuration with on-board bias resistors); <math>f_i = 1.9\text{ GHz}</math></i>						
$V_{DD1}, V_{DD2}$	Supply voltage			5		V
$I_{D1}, I_{D2}$	Supply current	$V_{EE1} = V_{EE2} = -0.66\text{ V}$		50		mA
G	Gain			20,3		dB
NF	Noise Figure			0,65		dB
IIP3	Input third order intercept point			TBD		dBm
$P_{1dB}$	Output Power @ 1dB gain compression			10		dBm
$S_{11}$	Input reflection coefficient	50 $\Omega$ source		-22		dB
$S_{22}$	Output reflection coefficient	50 $\Omega$ load		-22		dB

(\*) Measurement reference planes are the INPUT and OUTPUT SMA connectors.



**Caution** : This device is a high performance RF component and can be damaged by inappropriate handling. Standard ESD precautions should be followed. OMMIC document "OM-CI-MV/ 001/ PG" contains more information on the precautions to take.

## S-PARAMETERS

 $V_D = 4 \text{ V}; I_D = 50 \text{ mA}; T_{\text{amb}} = + 23 \text{ }^\circ\text{C}$ 

Frequency (GHz)	S11	Ang S11 (°)	S21	Ang S21 (°)	S12	Ang S12 (°)	S22	Ang S22 (°)
0.1	0,97322	-6,58414	23,57163	176,13541	0,00245	52,11044	0,70211	10,60726
0.2	0,95109	-12,14739	23,72555	165,05527	0,00342	56,29639	0,74298	2,70614
0.3	0,92192	-17,48830	23,06635	155,66167	0,00446	60,77167	0,75002	-1,65578
0.4	0,88658	-22,41731	22,11695	147,20802	0,00558	63,28578	0,75075	-4,89710
0.5	0,84775	-26,86021	21,02926	139,50044	0,00672	64,47227	0,74944	-7,64587
0.6	0,80788	-30,80858	19,89177	132,45422	0,00788	64,84617	0,74730	-10,13258
0.7	0,76874	-34,29243	18,76239	126,00159	0,00905	64,70856	0,74481	-12,46506
0.8	0,73148	-37,36183	17,67722	120,07571	0,01022	64,23167	0,74218	-14,70282
0.9	0,69669	-40,07445	16,65644	114,61091	0,01140	63,51693	0,73950	-16,88239
1	0,66463	-42,48790	15,70932	109,54531	0,01258	62,62662	0,73679	-19,02796
1.1	0,63531	-44,65555	14,83809	104,82285	0,01377	61,60073	0,73408	-21,15631
1.2	0,60859	-46,62468	14,04081	100,39397	0,01496	60,46608	0,73135	-23,27960
1.3	0,58428	-48,43596	13,31321	96,21568	0,01616	59,24137	0,72860	-25,40697
1.4	0,56215	-50,12376	12,64996	92,25105	0,01737	57,94009	0,72580	-27,54552
1.5	0,54196	-51,71668	12,04533	88,46857	0,01859	56,57225	0,72296	-29,70096
1.6	0,52349	-53,23837	11,49372	84,84135	0,01981	55,14542	0,72005	-31,87807
1.7	0,50654	-54,70818	10,98978	81,34653	0,02104	53,66546	0,71707	-34,08094
1.8	0,49090	-56,14192	10,52863	77,96456	0,02228	52,13693	0,71403	-36,31322
1.9	0,47642	-57,55238	10,10581	74,67875	0,02352	50,56341	0,71090	-38,57822
2	0,46296	-58,94993	9,71732	71,47474	0,02477	48,94776	0,70769	-40,87901
2.1	0,45038	-60,34289	9,35959	68,34016	0,02603	47,29225	0,70440	-43,21849
2.2	0,43858	-61,73790	9,02943	65,26430	0,02730	45,59866	0,70103	-45,59943
2.3	0,42746	-63,14027	8,72404	62,23785	0,02857	43,86846	0,69759	-48,02450
2.4	0,41693	-64,55416	8,44088	59,25269	0,02985	42,10277	0,69407	-50,49630
2.5	0,40694	-65,98282	8,17773	56,30170	0,03113	40,30252	0,69050	-53,01733
2.6	0,39742	-67,42876	7,93259	53,37861	0,03242	38,46842	0,68687	-55,59004
2.7	0,38832	-68,89384	7,70370	50,47790	0,03370	36,60107	0,68320	-58,21678
2.8	0,37960	-70,37946	7,48946	47,59470	0,03499	34,70092	0,67950	-60,89983
2.9	0,37123	-71,88655	7,28845	44,72466	0,03629	32,76835	0,67579	-63,64132
3	0,36318	-73,41574	7,09938	41,86396	0,03758	30,80368	0,67208	-66,44330
3.2	0,34796	-76,54152	6,75261	36,15730	0,04015	26,77908	0,66474	-72,23598
3.4	0,33383	-79,75712	6,44116	30,45187	0,04271	22,62911	0,65767	-78,29037
3.6	0,32076	-83,06078	6,15847	24,72993	0,04522	18,35589	0,65106	-84,61471
3.8	0,30874	-86,44992	5,89907	18,97809	0,04768	13,96204	0,64515	-91,21166
4	0,29785	-89,92234	5,65841	13,18675	0,05007	9,45108	0,64020	-98,07668
4.5	0,27618	-98,97054	5,11498	-1,49685	0,05553	-2,30456	0,63377	-116,30161
5	0,26412	-108,61978	4,62182	-16,46979	0,05997	-14,64542	0,63882	-135,61570
5.5	0,26369	-119,06646	4,15284	-31,64137	0,06300	-27,39637	0,65732	-155,21044
6	0,27614	-130,48278	3,69664	-46,84370	0,06436	-40,33009	0,68816	-174,18116

**Note : Measurement reference planes are the Ceramic package Leads, a TRL calibration method is used.**

**NOISE-PARAMETERS**
 $V_D = 4 \text{ V}; I_D = 50 \text{ mA}; T_{\text{amb}} = + 23 \text{ }^\circ\text{C}.$ 

Frequency (GHz)	NF <sub>min</sub> (dB)	$\Gamma_{\text{opt}}$	Ang $\Gamma_{\text{opt}}$ (°)	R <sub>n0</sub>
0.1	0,166	0,938	3,674	0,128
0.2	0,175	0,906	5,866	0,103
0.3	0,185	0,877	8,034	0,095
0.4	0,197	0,848	10,217	0,091
0.5	0,208	0,818	12,415	0,088
0.6	0,221	0,790	14,627	0,086
0.7	0,233	0,761	16,852	0,085
0.8	0,245	0,733	19,093	0,083
0.9	0,258	0,706	21,349	0,082
1	0,270	0,679	23,624	0,080
1.1	0,283	0,653	25,919	0,079
1.2	0,296	0,627	28,237	0,077
1.3	0,308	0,602	30,581	0,076
1.4	0,321	0,577	32,954	0,075
1.5	0,333	0,553	35,359	0,073
1.6	0,346	0,529	37,802	0,072
1.7	0,358	0,505	40,287	0,070
1.8	0,371	0,482	42,819	0,069
1.9	0,383	0,460	45,405	0,067
2	0,396	0,437	48,052	0,066
2.1	0,408	0,416	50,770	0,064
2.2	0,420	0,394	53,568	0,063
2.3	0,432	0,373	56,458	0,062
2.4	0,445	0,353	59,455	0,060
2.5	0,457	0,333	62,575	0,059
2.6	0,469	0,313	65,837	0,057
2.7	0,481	0,294	69,264	0,056
2.8	0,493	0,276	72,885	0,055
2.9	0,505	0,258	76,732	0,053
3	0,516	0,241	80,843	0,052
3.2	0,540	0,209	90,039	0,050
3.4	0,563	0,180	100,899	0,048
3.6	0,586	0,157	113,865	0,047
3.8	0,608	0,140	129,148	0,046
4	0,630	0,131	146,252	0,045
4.5	0,685	0,143	-172,861	0,046
5	0,738	0,184	-145,354	0,051
5.5	0,790	0,232	-127,803	0,059
6	0,842	0,277	-115,356	0,071

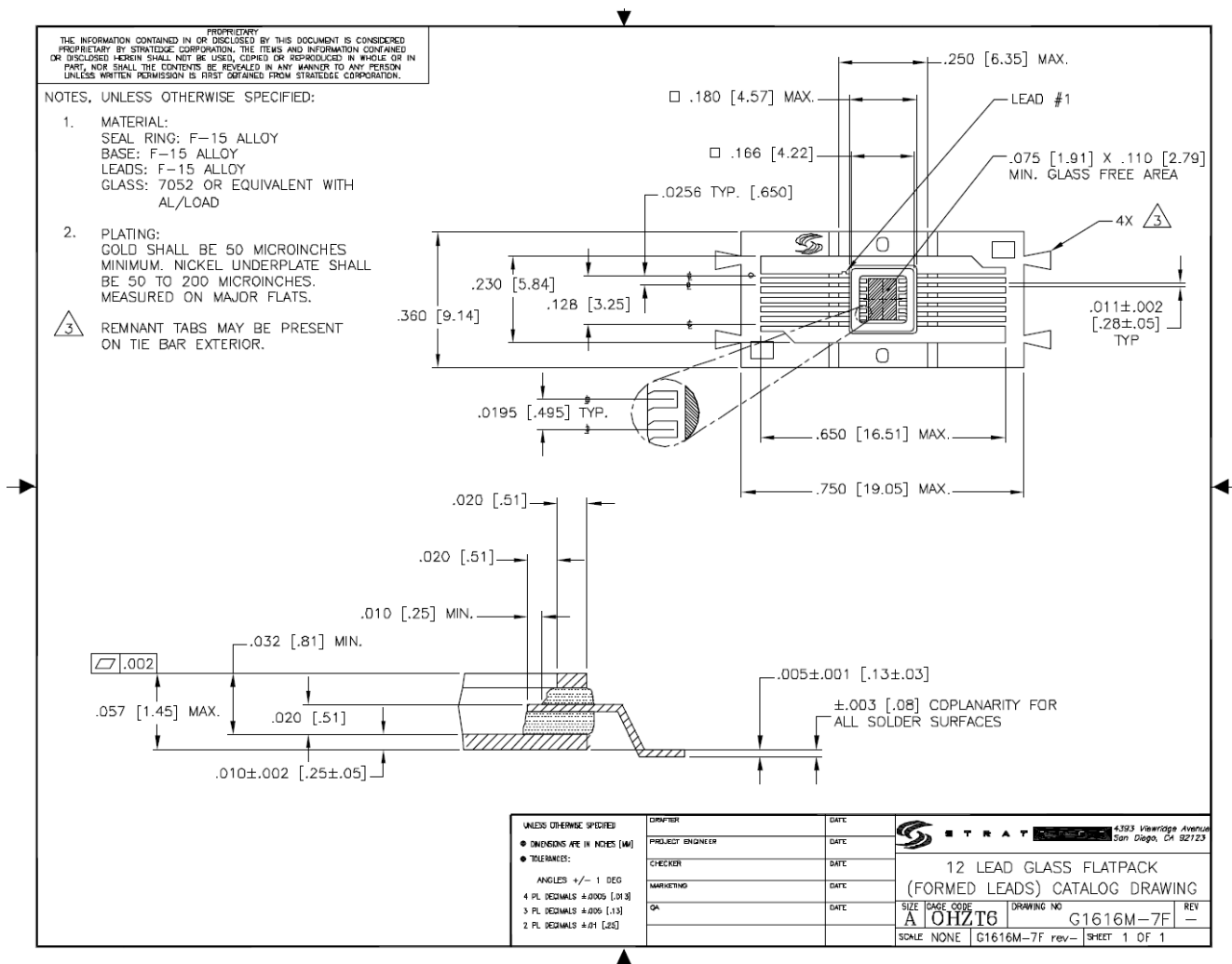
Note : The reference planes are the Ceramic Package Leads, R<sub>n0</sub> is the Noise Resistance normalised to 50 W.

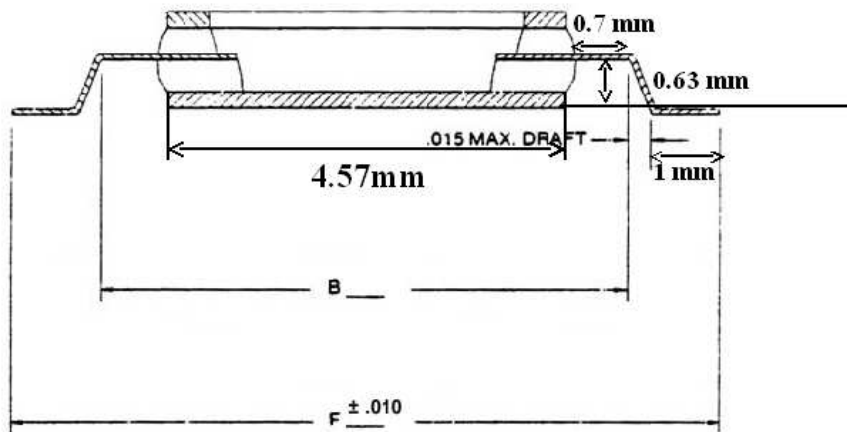
**PACKAGE**

Type	Description	Terminals	Pitch (mm)	Package size (mm)
Ceramic	DIL package with exposed heat sink	16	0.65	4.6 x 8.7 x 1.6

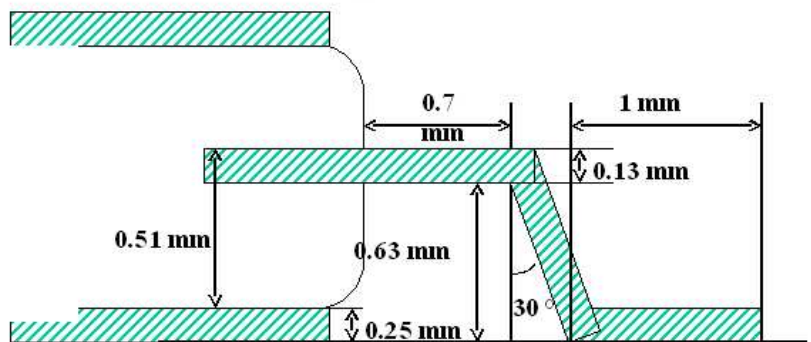
**PACKAGE OUTLINE AND PCB LAND PATTERN**

Description of the package G1616M-7F



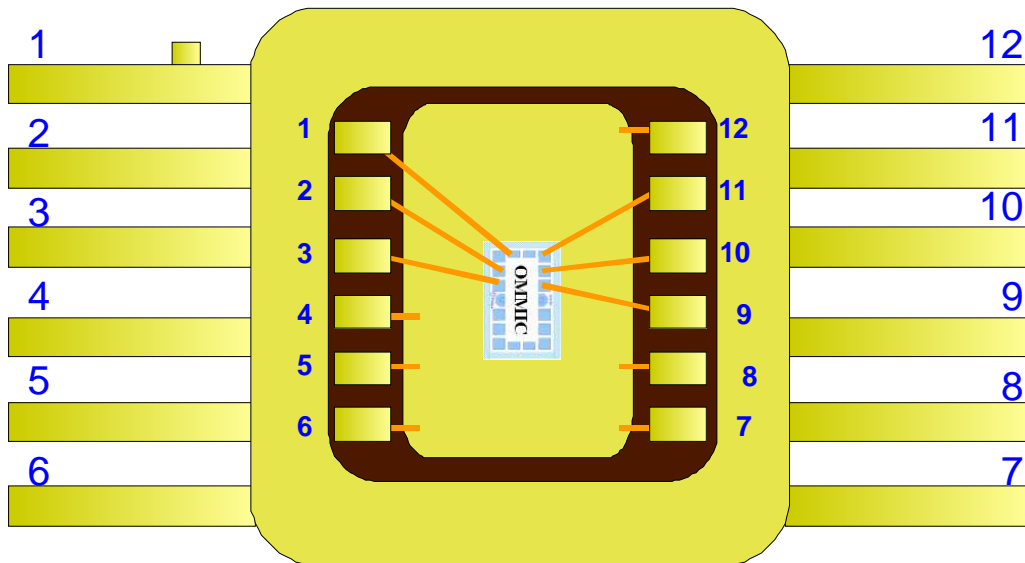


gullwing form B=6 mm  
gullwing form F=8.7 mm



**Dimensions of the Gullwing leads**

**INTERNAL BOUNDING DIAGRAM**



*Pin out configuration of the LNA CGY2108GS*

**Note :**

*It is essential in order to ensure good performance and stability that the central ground pad of the QFN package is suitably connected to the ground.*

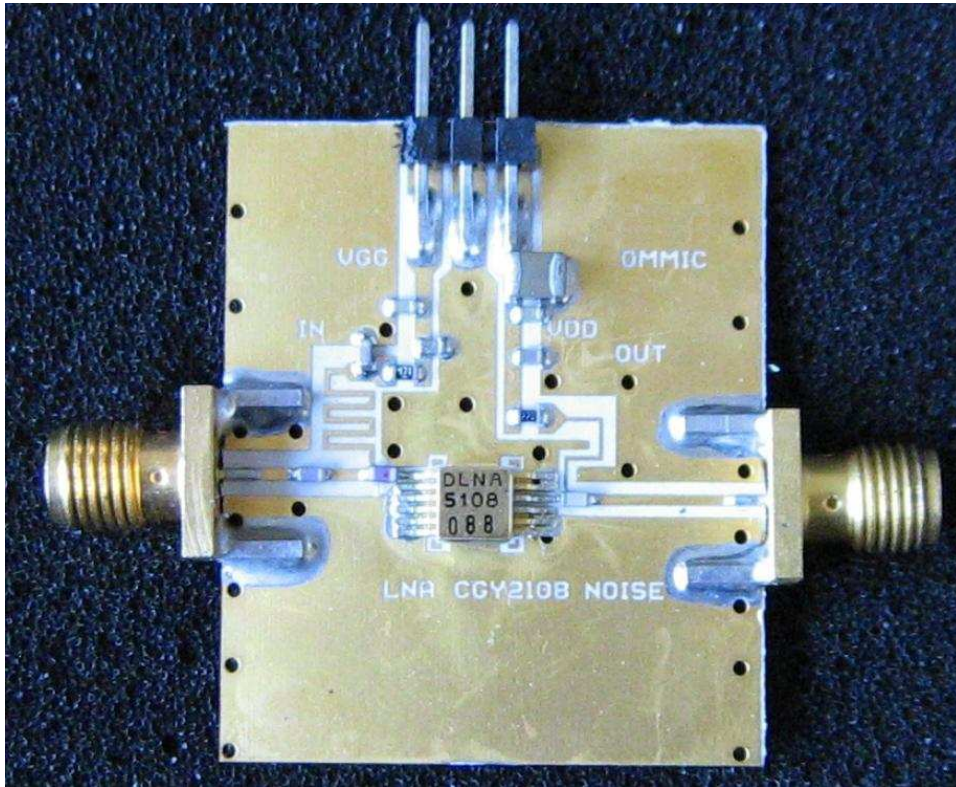
**PHOTOGRAPH OF CGY2108GS LNA**

*Photograph of the LNA CGY2108GS*

**CGY2108GS LNA PIN OUT CONFIGURATION**

Symbol	Pin	Description
IN	1	Amplifier : Gate (RF&DC Input)
OUT	10	Amplifier : Drain (RF&DC Output)
GND	2,3,9,11	Ground
NC	4,5,6,7,8,12	Not Connected





*Close view of CGY2108GS Demo Board*

## ORDERING INFORMATION

Generic type	Package type	Version	Sort Type	Description
CGY2108	GS	C1		LNA, Hermetic Ceramic Package
CGY2108	GS	C1	REFBOARD	Single Ended Reference Board 1900MHz



## DEFINITIONS

### Limiting values definition

Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

### Application information

Applications that are described herein for any of these products are for illustrative purposes only. OMMIC makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

## DISCLAIMERS

### Life support applications

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. OMMIC's customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify OMMIC for any damages resulting from such application.

### Right to make changes

OMMIC reserves the right to make changes, without notice, in the products, including circuits, standard cells, and/or software, described or contained herein in order to improve design and/or performance. OMMIC assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.



**Document History : Version 1.0, Last Update 26/03/2012**