GRAND-DUCHÉ DE LUXEMBOURG

Ministère du Développement durable et des Infrastructures
Département des Transports

L-2938 Luxembourg

SOCIÉTÉ NATIONALE DE CERTIFICATION ET D'HOMOLOGATION
s.à r.l.

Registre de Commerce: B 27180

L-5201 Sandweiler

Référence: E13*10R00*10R04*13377*00

Annexes: - Rapport Technique
- Fiche de Renseignements du constructeur

Sandweiler, le 02 septembre 2014

Communication concernant:[(2)]
Communication concerning:

- **la délivrance d'une homologation**
  approval granted
- ~~**l'extension d'homologation**~~
  ~~approval extended~~
- ~~**le refus d'homologation**~~
  ~~approval refused~~
- ~~**le retrait d'homologation**~~
  ~~approval withdrawn~~
- ~~**l'arrêt définitif de la production**~~
  ~~production definitely discontinued~~

d'un type de sous-ensemble ~~électrique~~/électronique[(2)] en ce qui concerne le Règlement N° 10
of a type of ~~electrical~~/electronic sub-assembly with regard to Regulation N° 10

Numéro d'homologation par type:
Approval number: E13*10R00*10R04*13377*00

Marque d'homologation:
Approval mark: E13 10R - 04 13377

1.	**Fabricant: (marque commerciale du constructeur):** Make (trade name of manufacturer):	planTEc
2.	**Type:** Type:	planTEc-GPS-Glonass-Galileo high gain
	Dénomination(s) commerciale(s) générale(s): General commercial description(s):	Not applicable
	Version(s)/Variante(s): *Version(s)/Variant(s):*	*Not applicable*
3.	**Moyens d'identification du type, s'ils sont marqués sur le ~~véhicule~~ / composant / ~~entité technique~~[(2)]:** Means of identification of type, if marked on the ~~vehicle~~ / component / ~~separate technical unit~~:	Refer to item 6.
3.1.	**Emplacement de ce marquage:** Location of that marking:	Refer to item 6.

4.	**Catégorie du véhicule:** Category of vehicle:	Not applicable
5.	**Nom et adresse du constructeur:** Name and address of manufacturer:	REEL Reinheimer Elektronik GmbH Felsweg 6A D – 35435 Wettenberg
6.	**Dans le cas de composants ou d'entités techniques, emplacement et procédé de fixation de la marque de réception CEE:** In the case of components and separate technical units, location and method of affixing of the ECE approval mark:	Sticker fixed on upper side power line
7.	**Adresse(s) de l' (des) usine(s) d'assemblage:** Address(es) of assembly plant(s):	REEL Reinheimer Elektronik GmbH Felsweg 6A D – 35435 Wettenberg
8.	**Informations supplémentaires (s'il y a lieu):** Additional informations (where applicable):	See appendix
9.	***Autorité déléguée:*** *Assigned authority:*	*Société Nationale de Certification et d'Homologation* *L-5201 Sandweiler*
	Service technique responsable de l'exécution des essais: Technical service responsible for carrying out the tests:	Luxcontrol S.A. B.P. 349 L-4004 Esch-sur-Alzette
10.	**Date du rapport d'essai:** Date of test report:	21.08.2014
11.	**Numéro du rapport d'essai:** Number of test report:	LCA 54 0400 001 14
12.	**Remarques (s'il y a lieu):** Remarks (if any):	See appendix

13. **Lieu:** Sandweiler
Place:

14. **Date:** 02 septembre 2014
Date:

15. **Signature:**
Signature:

Pour le Département des Transports

Marco FELTES
Inspecteur principal 1er en rang

Pour la SNCH

Claude LIESCH
Directeur

16. **L'index de l'ensemble des renseignements déposé chez l'autorité de réception, qui peut être obtenu sur demande, est joint.**
The index to the information package lodged with the approval authority, which may be obtained on request, is attached.

See index to type-approval report

17. **Raison(s) de l'extension:** Not applicable
Reason(s) for extension:

[2] **Biffer la mention inutile**
Strike out what does not apply

Appendice
Appendix

au certificat d'homologation par type N° E13*10R00*10R04*13377*00
to type-approval certificate N° E13*10R00*10R04*13377*00
concernant l'homologation par type d'un sous ensemble électrique/électronique selon le Règlement N° 10.
concerning the type-approval of an electrical/electronic sub-assembly under Regulation N° 10.

1.	**Informations supplémentaires.** Additional information.	
1.1.	**Tension nominale du système électrique [V]:** Electrical system rated voltage [V]:	3 to 5V d.c. (supplied over transmission cable)
	Masse: Ground:	Negative
1.2.	**Ce SEEE peut être utilisé sur n'importe quel type de véhicule avec les restrictions suivantes:** This ESA can be used on any vehicle type with the following restrictions:	Not applicable
1.2.1.	**Conditions d'installation, s'il y a lieu:** Installation conditions, if any:	Not applicable
1.3.	**CE SEEE peut seulement être utilisé sur les types de véhicules suivants:** This ESA can be used only on the following vehicle types:	Not applicable
1.3.1.	**Conditions d'installation, s'il y a lieu:** Installation conditions, if any:	Not applicable
1.4.	**La (les) méthode(s) spécifique(s) d'essais utilisée(s) et les bandes de fréquences couvertes pour déterminer l'immunité étai(ent): (indiquez s'il vous plaît à partir de l'annexe 9 la méthode précise utilisée).** The specific test method(s) used and the frequency ranges covered to determine immunity were: (Please specify precise method used from annex 9).	Not applicable
1.5.	**Laboratoire accrédité au titre de la norme ISO 17025 et reconnu par l'autorité d'homologation chargé d'effectuer les essais:** Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests:	Not applicable
2.	**Commentaires:** Remarks:	None

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Registre de Commerce: B 27180

L-5201 Sandweiler

Référence: E13*10R00*10R04*13377*00

Annexes: - Rapport Technique
- Fiche de Renseignements du constructeur

Sandweiler, le 02 septembre 2014

Index du dossier d'homologation

Index to type-approval report

	Numéro d'homologation: Approval number:	E13*10R00*10R04*13377*00
	Révision: Revision:	00
	Marque de fabrique ou de commerce: *Trade name or mark:*	*planTEc*
	Type: *Type:*	*planTEc-GPS-Glonass-Galileo high gain*
1.	**Procès-verbal d'essai:** Test report:	N° LCA 54 0400 001 14
	-Technical report: - Index:	Page 1 to 6 Annex A – Page 1
2.	**Dossier du constructeur:** Report of the manufacturer:	Annex B
	- Manufacturer's information document:	Page 1 to 32
3.	**Autres documents annexés:** Other documents annexed:	Not applicable
4.	**Date de délivrance de l'homologation initiale:** Date of issue of initial type approval:	02.09.2014
5.	**Date de la dernière délivrance de pages révisées:** Date of last issue of revised pages:	Not applicable
6.	**Date de la dernière délivrance d'une homologation révisée:** Date of last extension:	Not applicable

TECHNICAL REPORT

No.: LCA 54 0400 001 14

Inspection concerning the

Radio Interference (Electromagnetic Compatibility of vehicles)

performed according to

ECE – Regulation No. 10

Type: **planTEc-GPS-Glonass-Galileo high gain**
Manufacturer: **REEL Reinheimer Elektronik GmbH**
Felsweg 6
D – 35435 Wettenberg

Extension -- to ECE Type Approval no.: not applicable

Index:

E13*10R00*10R04*13377*00
Société Nationale de Certification et d'Homologation
L-5201 SANDWEILER (Luxembourg)
Organisme accrédité OLAS EN 45011
Accréditation N° 5/001 (Portée communiquée sur demande)

…

- Luxcontrol SA
1, Av. des Terres Rouges
BP 349
L-4004 Esch-sur-Alzette
LUXEMBOURG

Tél:++352-54.77.11-1
Fax:++352-54.77.11-203
E-Mail:info@luxcontrol.com
Int.:www.luxcontrol.com
N ident: LU 113 536 61
RC Lux.: B15664

BGL BNP Paribas Luxembourg
IBAN: LU56 0030 1612 0727 0000
BIC: BGLLLULL
Dexia-BIL
IBAN: LU48 0026 1824 1543 2600
BIC: BILLLULL

1. General

1.1. Test Provisions

The inspection was carried out according to the requirements of ECE-Regulation No. 10 including Supplement 2 to the 04 series of amendments, which entered into force on 15.7.2013.

1.2. Information concerning the electronic component and the requested approval

The statements below apply to the previous ECE type-approval as referred to on page 1.

1.2.1. [] Numbering according to the communication concerning the approval of ECE-R10

[1.] Make (trade name of manufacturer):

planTEc

[2.] Type and general commercial description(s):

Type: **planTEc-GPS-Glonass-Galileo high gain**
Version: --
Variants: --

[3.] Means of identification of type, if marked on the ~~vehicle~~ / component / ~~separate technical unit~~

See item [6.]

[3.1.] Location of that marking:

See item [6.]

[4.] Category of vehicle:

Not applicable

[5.] Name and address of manufacturer:

REEL Reinheimer Elektronik GmbH
Felsweg 6A
D – 35435 Wettenberg

[6.] In the case of components and separate technical units, location and method of affixing of the ECE type-approval mark:

Sticker fixed on upper side power line

[7.]	Address(es) of assembly plant(s):
	REEL Reinheimer Elektronik GmbH **Felsweg 6A** **D – 35435 Wettenberg**
[17.]	Reasons for extension:
	not applicable
1.2.2.	[] Numbering according to the communication concerning the approval of ECE-R10, Appendix to Annex 3B
[1.]	Additional information:
[1.1.]	Electrical system rated voltage:
	3 - 5 V d.c., negative earth (supplied over transmission cable)
[1.2]	This ESA can only be used on any vehicle type with the following restrictions:
[1.2.1.]	Installation conditions, if any:
	not applicable
[1.3.]	This ESA can only be used on the following vehicle types:
[1.3.1.]	Installation conditions, if any:
	not applicable
[1.4.]	The specific test method(s) used and the frequency ranges covered to determine immunity were:
	not applicable
[1.5.]	Laboratory accredited to ISO 17025 and recognised by the approval authority responsible for carrying out the tests:
	not applicable
[2.]	Remarks:
	not applicable

2. Inspections and their results

2.1. Version of the tested equipment

The following variants have been used for testing (if not stated in part 1.2.1. of this report):

- not applicable

2.2. Inspection items

	Inspector	Location of test:	Date of receipt of test item:	Date of test:
Main rep.	**M. Moscardelli**	**m. dudde hochfrequenz-technik Rottland 5 D – 51429 Bergisch Gladbach**	**25.7.2012**	**25.7.2012**

2.2.1. Test results

2.2.1.1. Broadband electromagnetic radiation:

Results of the measurement are in accordance with Annex 7 of ECE-R10:

Test facility **: outdoor / ~~indoor~~**
Signal strength measured over the frequency range 30 to 1000 MHz **: requirements fulfilled**

2.2.1.2. Narrowband electromagnetic radiation:

Results of the measurement are in accordance with Annex 8 of ECE-R10:

Test facility **: outdoor / ~~indoor~~**
Signal strength measured over the frequency range 30 to 1000 MHz : **requirements fulfilled**

2.2.1.3. Immunity of ESA to electromagnetic radiation

This ESA has no 'immunity related functions' and is exempted as set out in item 6.10.3. of the Regulation.

2.2.1.4. Immunity to transient disturbances conducted along supply lines:

not applicable, the ESA is not connected to the power supply of the vehicle.

2.2.1.5. Emission of conducted disturbances:

not applicable, the ESA is not switched, does not contain switches or does not include inductive loads.

2.3. **Remarks**

Inspection results are only applicable to items, which have been tested.

2.4. **Test facilities**

Calibration of measuring and test equipment used to carry out the inspections is in accordance with the ECE-Regulation stated in 1.1. of this report and with ISO 17025.

Inspectors stated under 2.2. of this report were in charge of performing and/or evaluating the tests.

3. Evaluation of test results

3.1. **Variants and equipment covered**

The tests carried out cover the following variations as far as these are relevant for the electromagnetic compatibility:

- not applicable

3.2. **Remarks**

3.2.1. General

Not applicable

4. Statement of compliance

The inspections items and measurements carried out have shown the compliance of the vehicle type described in this report and the attached Annex with the requirements of ECE-Regulation No. 10 including Supplement 2 to the 04 series of amendments, which entered into force on 15.7.2013.

Esch/Alzette, 21 August 2014

Luxcontrol s.a.
Service Homologation-automobile

Paul Wax
Ingénieur-Inspecteur

David Durazzi
Ingénieur-Inspecteur

Annex

Index to the information package, including a summary in chronological order, concerning extensions and/or amendments

ECE type-approval No.: --

Main Report

Technical Report No.: LCA 54 0400 001 14 Pages 1 to 6

Composition of the Annex:

Index to the information folder:

Annex 2B

INFORMATION DOCUMENT FOR TYPE APPROVAL OF AN ELECTRIC/ELECTRONIC SUB-ASSEMBLY WITH RESPECT TO ELECTROMAGNETIC COMPATIBILITY

The following information, if applicable, shall be supplied in triplicate and must include a list of contents. Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 or on a folder of A4 format. Photographs, if any, shall show sufficient detail.

If the systems, components or separate technical units have electronic controls, information concerning their performance shall be supplied.

1. Make (trade name of manufacturer): .planTEc.....

2. Type: ..planTEc-GPS-Glonass-Galileo high gain.....

3. Means of identification of type, if marked on the component/separate technical unit: 1/

3.1. Location of that marking: ..on the label, this is mounted on the antenna cable.....

4. Name and address of manufacturer: .REEL Reinheimer Elektronik GmbH, Felsweg 6A, D-35435 Wettenberg.....

Name and address of authorized representative, if any: ...../.....

5. In the case of components and separate technical units, location and method of affixing of the approval mark: .....

6. Address(es) of assembly plant(s): ...Felsweg 6A, D-35435 Wettenberg.....

7. This ESA shall be approved as a component/STU 2/

8. Any restrictions of use and conditions for fitting: ...../.....

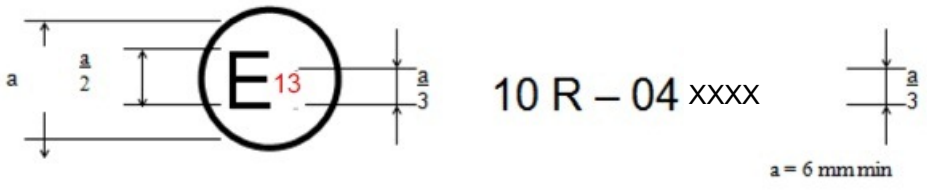
9. Electrical system rated voltage ...3 to 5..... V, positive/negative 2/ ground.

Appendix 1:

Description of the ESA chosen to represent the type (electronic block diagram and list of main component constituting the ESA (e.g. make and type of microprocessor, crystal, etc.).

Appendix 2:

Relevant test report(s) supplied by the manufacturer from a test laboratory accredited to ISO 17025 and recognized by the Approval Authority for the purpose of drawing up the type approval certificate.


a
a/2
E13
a/3
10 R – 04 xxxx
a/3
a = 6 mm min

Planar Combination Antenna C70ZGVR Roof Mount

GSM 850/900/1800/1900 MHz + UMTS + GPS/GNSS low current + WLAN 2400 MHz

- **Waterproof TÜV passed IP69K mounted**
- **Antenna available in black, white and blue other colours on demand**
- **Including 868 MHz – services and DECT**
- **Our products are RoHS- and REACH-conform**

GLONASS included

REEL Reinheimer Elektronik GmbH
Felsweg 6a, 35435 Wettenberg, Germany
www.reel-gmbh.de Phone: +49 641 986 080
info@reel-gmbh.de Fax: +49 641 986 0811

Technical Data

GSM

Frequency Range	850/900/1800/1900 + 2100 MHz
VSWR*	< 2.0 typ.
Peak Gain*	+5 dBi typ. (900 MHz)
	+3 dBi typ. (1800MHz)
	+1 dBi typ. (2100 MHz)
Power max.	10 W
Diagnostic resistor	10 kΩ (others on request)

GPS/GNSS

Frequency	1575 … 1609 MHz
VSWR	1.5 typ.
Peak Gain	18 dBi typ.
Power Supply	3V ±10%; 4mA typ.
V_{DD} max.	4.0V
Input Power max.	+10dBm
Current max.	4.5mA

WLAN

Frequency Range	2400 MHz
VSWR*	< 2.0 typ.
Peak Gain*	+6 dBi typ
Power max.	10 W

* Measured with 0.6m cable on 30x30cm ground plane

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Felsweg 6a, 35435 Wettenberg, Germany
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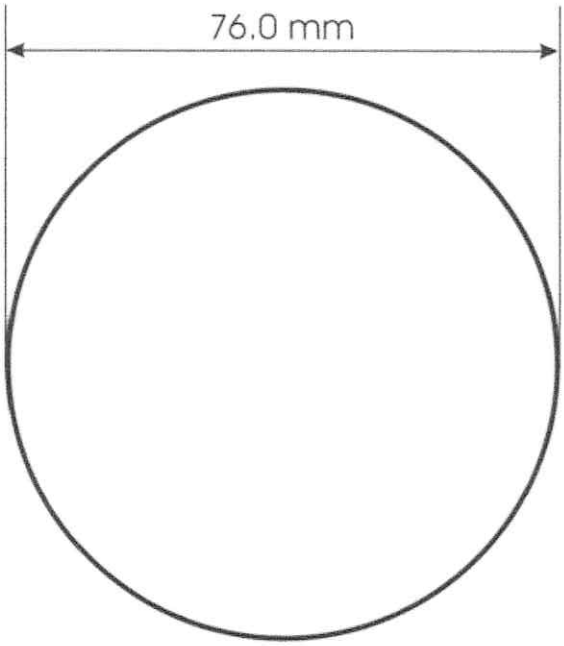
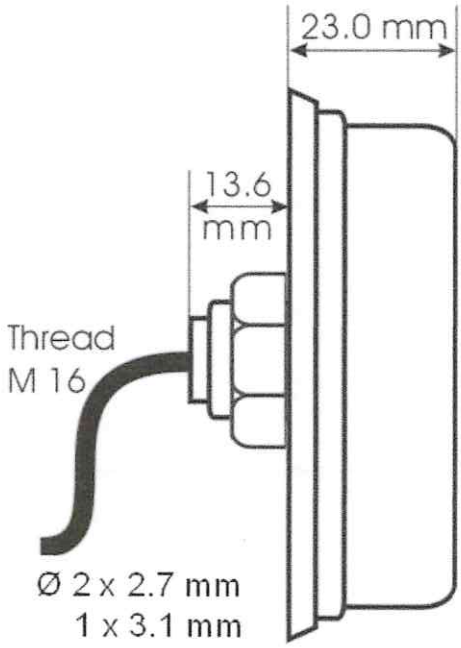
info@reel-gmbh.de Fax: +49 641 986 0811

Mechanical Data

Dimensions (ØxH)	ca. 76 mm x 23 mm
Temperature Range	-40°C to +85°C (operating temperature)
Connection (Standard)	ca. 3m connecting cable RG174 with GSM/FME(f); GPSGNSS/SMA(m) ca. 3m connecting cable RG174 low loss with WLAN/SMA(m)reverse Other cablelengths and connectors see ordering example and connector list in Internet





* Measured with 0.6m cable on 30x30cm ground plane

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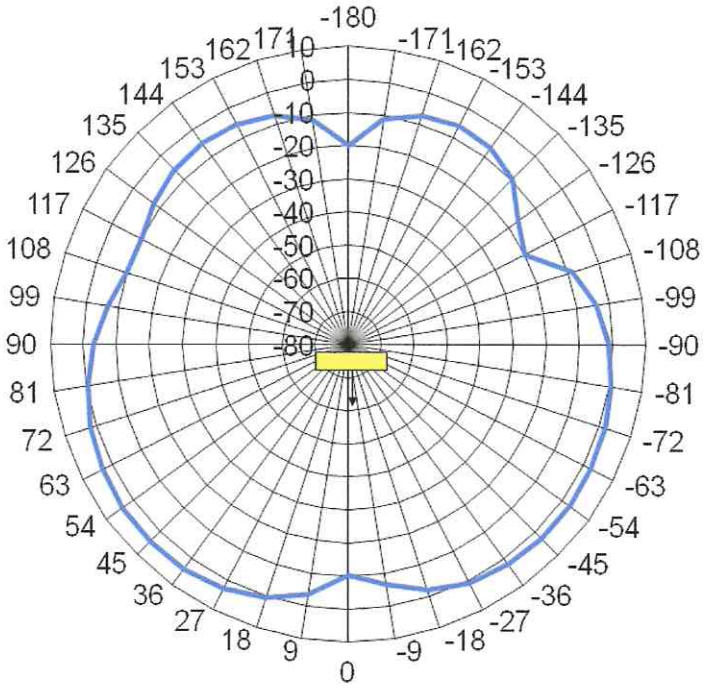
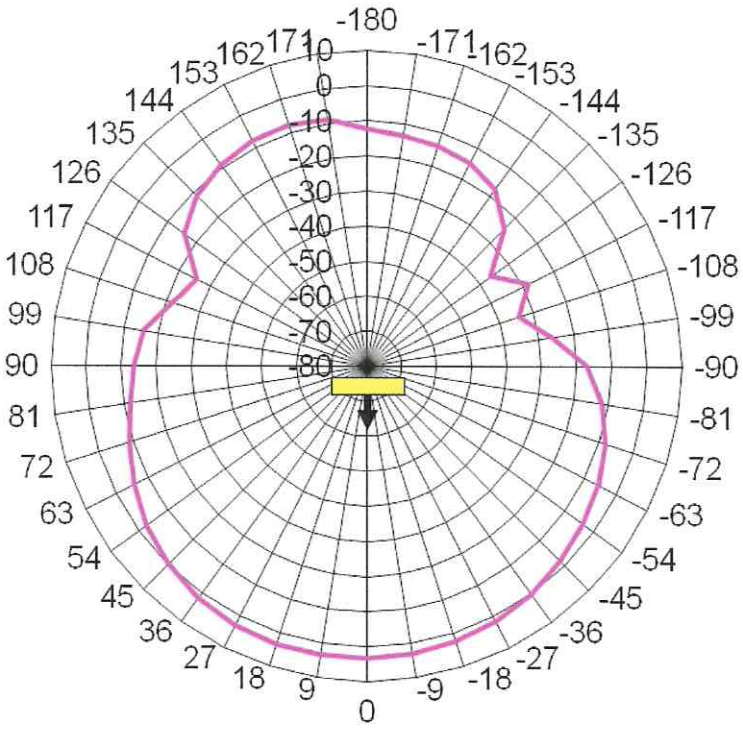
Radiation diagram (typ.)*



GSM 900 MHz
Peak Gain: +5 dBi



GSM 1800 MHz
Peak Gain: +3 dBi

* Measured with 0.6m cable on 30x30cm ground plane

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Felsweg 6a, 35435 Wettenberg, Germany
www.reel-gmbh.de Phone: +49 641 986 080
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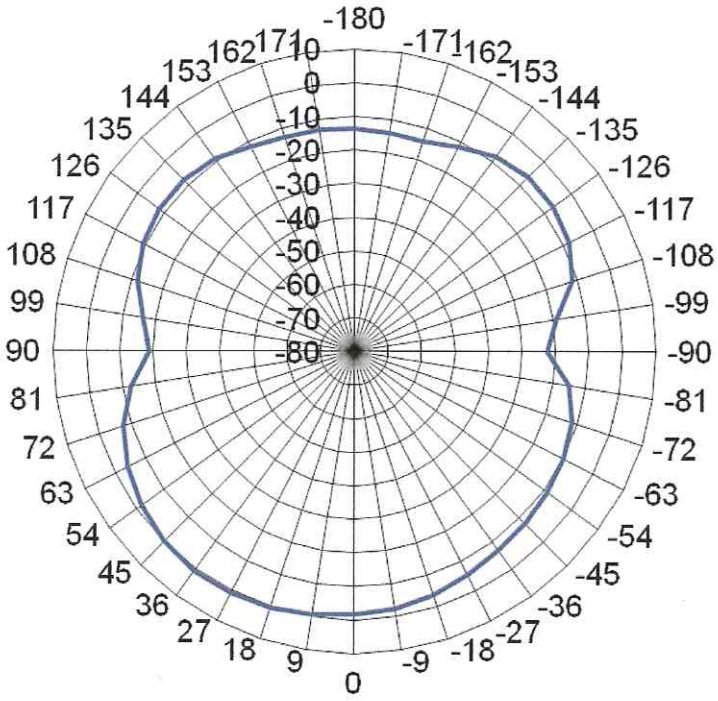
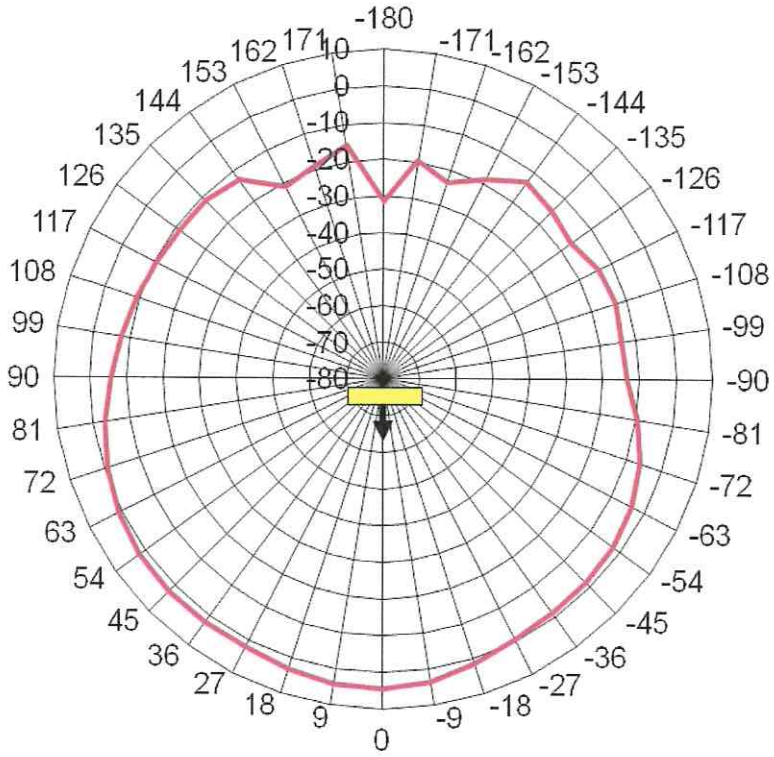
Radiation diagram (typ.)*



GSM 2100 MHz
Peak Gain: +1 dBi



WLAN 2400 MHz
Peak Gain: +6 dBi

* Measured with 0.6m cable on 30x30cm ground plane

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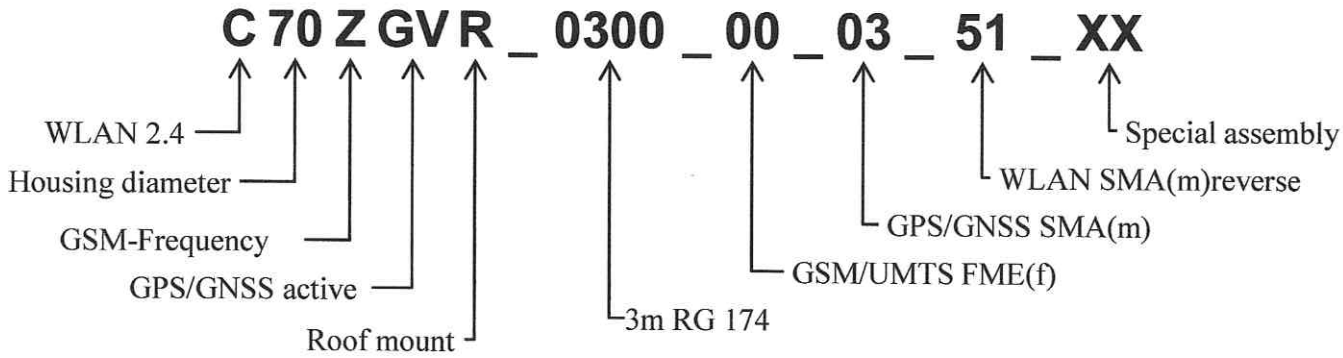
Accrediation

☐	E-Code	e 13 02 1510	high gain (A)
☐	E-Code	e 13 02 1509	low gain (L)
☐	E-Code	e 13 03 6371	low current (V)

Mounting Instructions

- No extra ground planes are necessary for this antenna (ground plane inside).
- Mountable on all clean, smooth and rust free surfaces.
- Tightening torque on M16 nut is min. 4Nm to max. 6Nm
- Mounting bore hole is Ø 16mm (+2mm/-0mm)
- Alternatively the bottom is available as aluminum diecast with tightening torque 12 Nm to max. 15 Nm (AL).
- Mounting on a separate support possible, if the cable entrance is watertight.
- Antenna available with waterproof cable entrance (PW or AW).

Ordering example



Warranty

The lawful warranty conditions apply.

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www.reel-gmbh.de
info@reel-gmbh.de
Phone: +49 641 986 080
Fax: +49 641 986 0811

Stücklisten Stand: 11.05.2012

PlanTEc -GPS_Glonass-Galileo

REEL No	Bestell-Bezeichnung	Funktion	Low gain part	High gain part
PLA-003GA (aktuelle Variante) bestückt nach Schaltplan Nr. 212.05.00155 vom 11.05.2012 Bauteile 200 er Nr. Kreis	REEL Produkt	Platine		X
PLA-003GV (aktuelle Variante) bestückt nach Schaltplan Nr. 212.05.00155 vom 11.05.2012 Bauteile 100 er Nr. Kreis	REEL Produkt	Platine	X	
VST 004	MAAL 007304	Verstärker		X
VST003V	UPC8211	Verstärker	X	
FIL002	TA0638A	Bandpassfilter	X	X
CER004	PA1575MZ50J4G	Keramik Patch-	x	x
	_17_16_1593 MHz	Antenne		
Sonstige Bauteile 100er/200er Nr.	abhängig vom Bestücker Bedingung: kein Ferrit	Bauelement	x	x

Anlage: Schaltplan 60 mm-Naviprint, Doc-No. 212.05.00155
Datenblatt: VST 004, VST003V, FIL 002, CER 004

MAAL-007304

Tyco Electronics

Low Noise Amplifier
0.5 - 3.0 GHz

M/A-COM Products
Rev. V2

Features

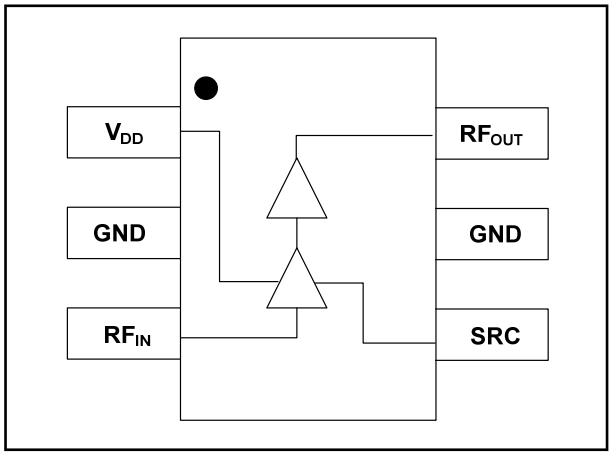
- Low Noise Figure: 0.7 dB at 2.3 GHz
- Single +3 to +5 V Supply Bias
- Low Current: 11.5 mA typical
- Lead-Free SOT-26 Plastic Package
- 100% Matte Tin Plating over Copper
- Halogen-Free “Green” Mold Compound
- RoHS* Compliant and 260°C Reflow Compatible

Description

M/A-COM’s MAAL-007304 low noise amplifier is a GaAs MMIC amplifier in a lead-free SOT-26 surface mount plastic package. The MAAL-007304 employs a monolithic 2-stage self-biased design and can be biased between +3 to +5 volts, depending on system requirements. The MAAL-007304 offers low noise, low current, and high gain. It can be tuned for various applications from 0.5 to 3 GHz.

M/A-COM fabricates the MAAL-007304 using a low noise PHEMT process to realize low noise and high gain. The process features full passivation for performance and reliability.

Functional Schematic



Pin Configuration

Pin No.	Pin Name	Description
1	V_{DD}	Bias
2	GND	Ground
3	RF_{IN}	RF Input
4	SRC	Source
5	GND	Ground
6	RF_{OUT}	RF Output

Ordering Information [1,2]

Part Number	Package
MAAL-007304-000000	Bulk Packaging
MAAL-007304-TR3000	3000 piece reel
MAAL-007304-001SMB	Sample Board, 2.3 - 2.5 GHz Tuning

1. Reference Application Note M513 for reel size information.
2. All sample boards include 5 loose parts.

Absolute Maximum Ratings [3,4]

Parameter	Absolute Maximum
RF Input Power	-15 dBm
Voltage	6.0 volts
Operating Temperature	-40 °C to +85 °C
Storage Temperature	-65 °C to +150 °C

3. Exceeding any one or combination of these limits may cause permanent damage to this device.
4. M/A-COM does not recommend sustained operation near - these survivability limits.

* Restrictions on Hazardous Substances, European Union Directive 2002/95/EC.

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298
Visit www.macom.com for additional data sheets and product information.

MAAL-007304

Tyco Electronics

Low Noise Amplifier
0.5 - 3.0 GHz

M/A-COM Products
Rev. V2

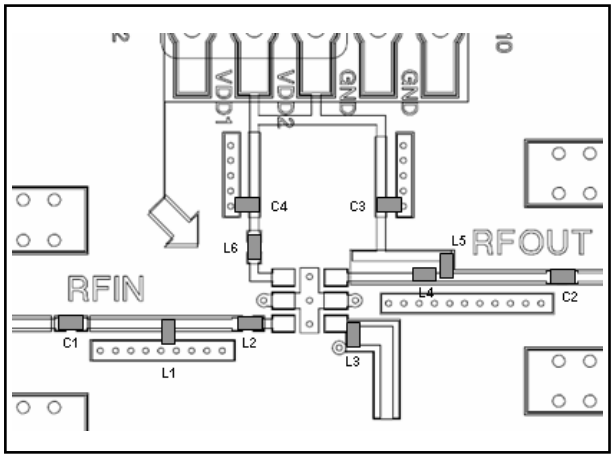
Electrical Specifications: F = 2.3 GHz, V_{DD} = +3 V, T_A = +25°C, Z_O = 50 Ω

Parameter	Units	Min.	Typ.	Max.
Gain	dB	24.0	25.5	27.0
Noise Figure	dB	—	0.7	0.85
Current	mA	—	11.5	13.0

Typical Performance: F = 2.3 GHz, V_{DD} = +3 V, T_A = +25°C, Z_O = 50 Ω

Parameter	Units	Typ.
Input Return Loss	dB	15
Output Return Loss	dB	10
Input IP_3	dBm	-6
Output IP_3	dBm	19
Output P1dB	dBm	7

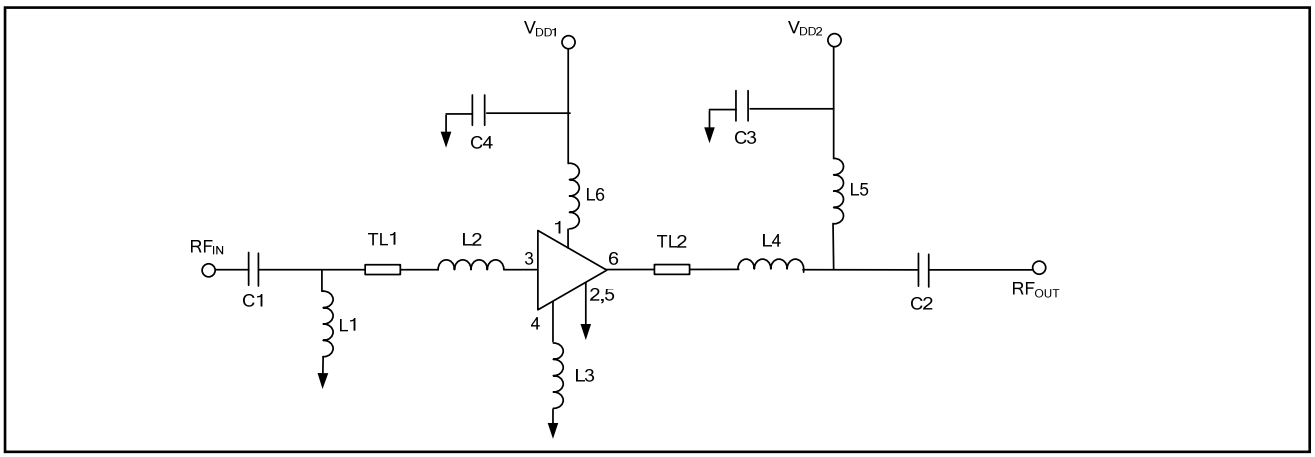
Recommended PCB Configuration



External Parts List

Component	Value	Footprint	Manufacturer
C1	3 pF	0603	ATC
C2	8.2 pF	0603	ATC
C3, C4	0.1 µF	0402	Panasonic
L1	5.6 nH	0402	Panasonic
L2, L5	6.8 nH	0402	Coilcraft
L3	1.5 nH	0402	Toko
L4	4.7 nH	0402	Toko
L6	7.5 nH	0402	Coilcraft
TL1	47.5 Ω, 34° @ 2.3 GHz		
TL2	47.5 Ω, 15.5° @ 2.3 GHz		

Schematic



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MAAL-007304

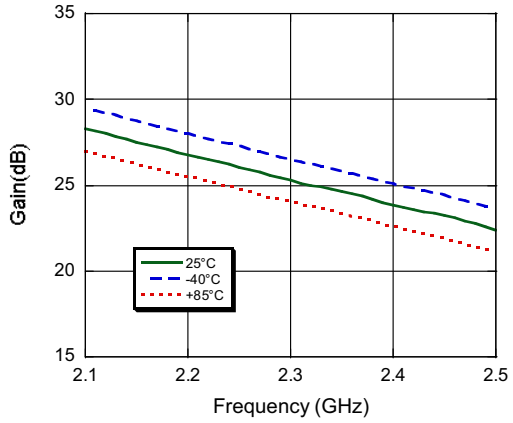
Tyco Electronics

Low Noise Amplifier
0.5 - 3.0 GHz

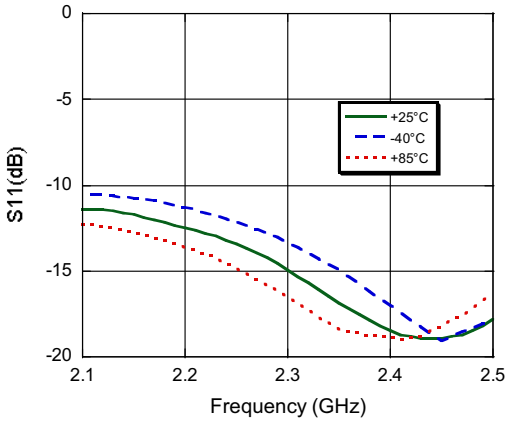
M/A-COM Products
Rev. V2

Typical Performance Curves @ 2.3 GHz

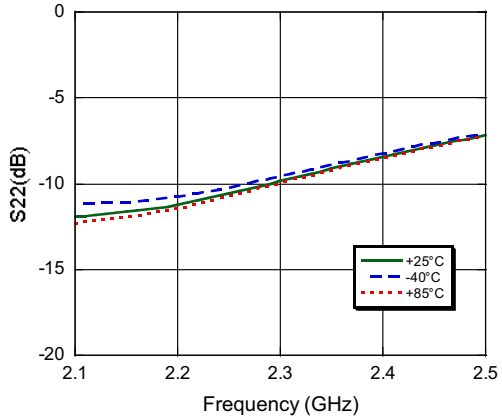
Gain



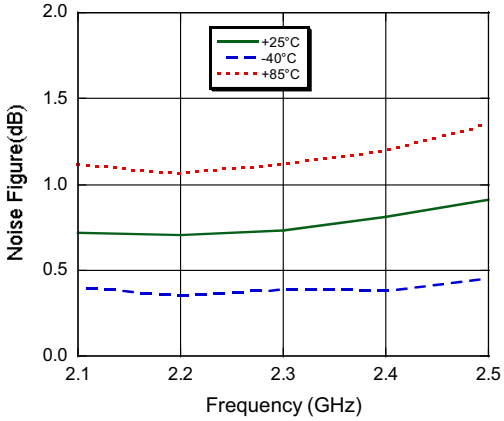
Input Return Loss



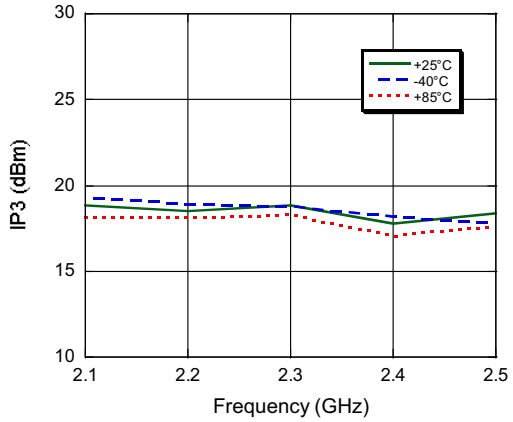
Output Return Loss



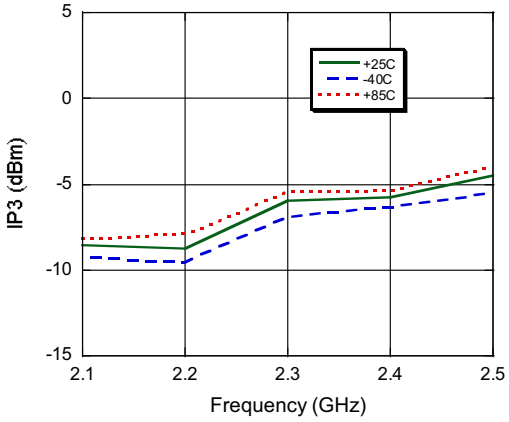
Noise Figure



Output IP3



Input IP3



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0.5 - 3.0 GHz

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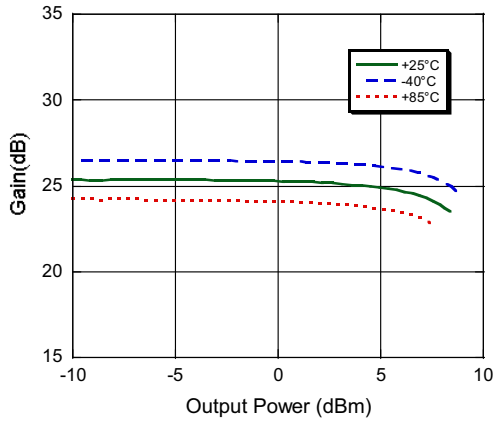
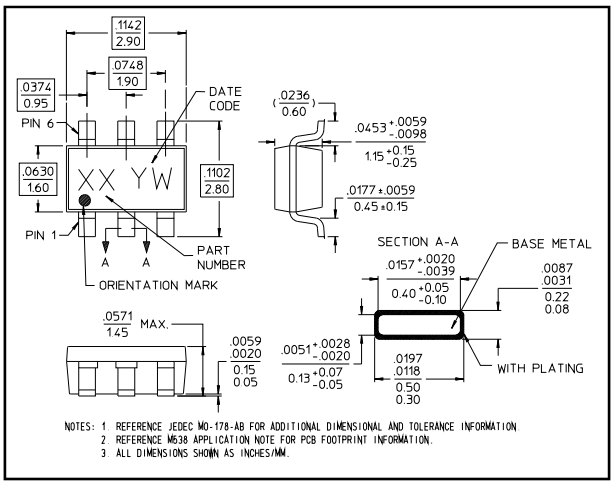
Typical Performance Curves

P1dB @ 2.3 GHz



Lead-Free SOT-26 Plastic Package†



† Reference Application Note M538 for lead-free solder reflow recommendations.
Meets JEDEC moisture sensitivity level 1 requirements.

Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

Gallium Arsenide Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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DATA SHEET

CEL

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC8211TK

SiGe LOW NOISE AMPLIFIER FOR GPS/MOBILE COMMUNICATIONS

DESCRIPTION

The μPC8211TK is a silicon germanium (SiGe) monolithic integrated circuit designed as a low noise amplifier for GPS and mobile communications.

The package is 6-pin lead-less minimold, suitable for surface mount.

This IC is manufactured using our 50 GHz f_{max} UHS2 (Ultra High Speed Process) SiGe bipolar process.

★ FEATURES

- Low noise : NF = 1.3 dB TYP. @ V_{CC} = 3.0 V
- High gain : G_P = 18.5 dB TYP. @ V_{CC} = 3.0 V
- Low current consumption : I_{CC} = 3.5 mA TYP. @ V_{CC} = 3.0 V
- Gain 1 dB compression output power : $P_{o\ (1\ dB)}$ = –6.0 dBm @ V_{CC} = 3.0 V
- Built-in power-save function
- High-density surface mounting : 6-pin lead-less minimold package (1.5 × 1.3 × 0.55 mm)

APPLICATION

- Low noise amplifier for GPS and mobile communications

ORDERING INFORMATION

Part Number	Order Number	Package	Marking	Supplying Form
μPC8211TK-E2	μPC8211TK-E2-A	6-pin lead-less minimold (1511 PKG) (Pb-Free) Note	6G	• Embossed tape 8 mm wide • Pin 1, 6 face the perforation side of the tape • Qty 5 kpcs/reel

Note With regards to terminal solder (the solder contains lead) plated products (conventionally plated), contact your nearby sales office.

Remark To order evaluation samples, contact your nearby sales office.
Part number for sample order: μPC8211TK-A

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

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Date Published January 2006 CP(K)
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The mark ★ shows major revised points.

E13*10R00*10R04*13377*00
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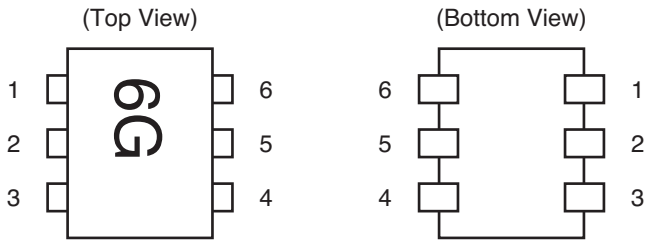
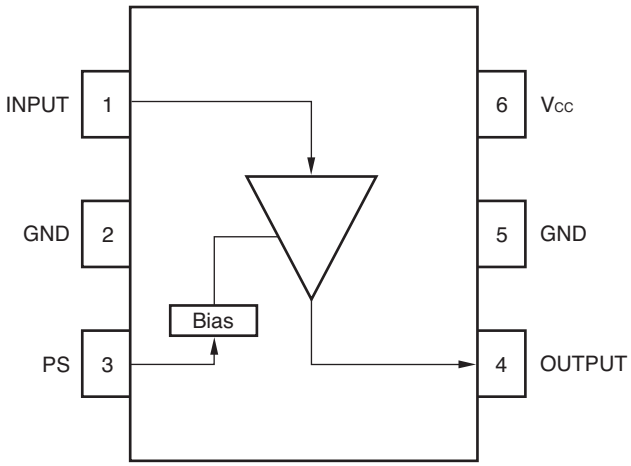
L-5201 SANDWEILER (Luxembourg)
Organisme accrédité OLAS EN 45011
Accréditation N° 5/001 (Portée communiquée sur demande)

PIN CONNECTIONS



Pin No.	Pin Name
1	INPUT
2	GND
3	PS
4	OUTPUT
5	GND
6	Vcc

INTERNAL BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Test Conditions	Ratings	Unit
Supply Voltage	V_{CC}	T_A = +25°C	4.0	V
Power-Saving Voltage	V_{PS}		−0.3 to V_{CC} +0.3	V
Power Dissipation of Package	P_D	T_A = +85°C **Note**	232	mW
Operating Ambient Temperature	T_A		−40 to +85	°C
Storage Temperature	T_{stg}		−55 to +150	°C
Input Power	P_{in}		+10	dBm

Note Mounted on double-side copper-clad 50 × 50 × 1.6 mm epoxy glass PWB

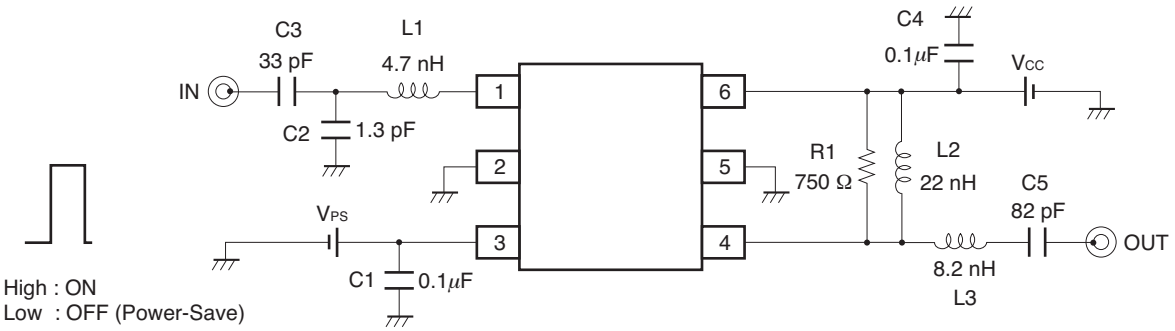
RECOMMENDED OPERATING RANGE

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	V_{CC}	2.7	3.0	3.3	V
Operating Ambient Temperature	T_A	−25	+25	+85	°C
Operating Frequency Range	f_{in}	−	1 575	−	MHz

★ ELECTRICAL CHARACTERISTICS (T_A = +25°C, V_{CC} = 3.0 V, V_{PS} = 3.0 V, f_{in} = 1 575 MHz, unless otherwise specified)

Parameter	Symbol	Test Conditions	MIN.	TYP.	MAX.	Unit
Circuit Current	I_{CC}	No Signal	2.5	3.5	4.5	mA
		At Power-Saving Mode	–	–	1	μA
Power Gain	G_P		15.5	18.5	21.5	dB
Noise Figure	NF		–	1.3	1.5	dB
Input 3rd Order Distortion Intercept Point	IIP_3		–	–12	–	dBm
Input Return Loss	RL_{in}		6.0	7.5	–	dB
Output Return Loss	RL_{out}		10	14.5	–	dB
Isolation	ISL		–	33.5	–	dB
Rising Voltage From Power-Saving Mode	V_{PSon}		2.2	–	–	V
Falling Voltage From Power-Saving Mode	V_{PSoff}		–	–	0.8	V
Gain Flatness	Flat	f_{RF} = ± 2.5 MHz	–	–	0.5	dB
Gain 1 dB Compression Output Power	$P_{O\ (1\ dB)}$		–	–6.0	–	dBm
Output Power	P_O	P_{in} = –10 dBm	–1.5	+2.0	–	dBm

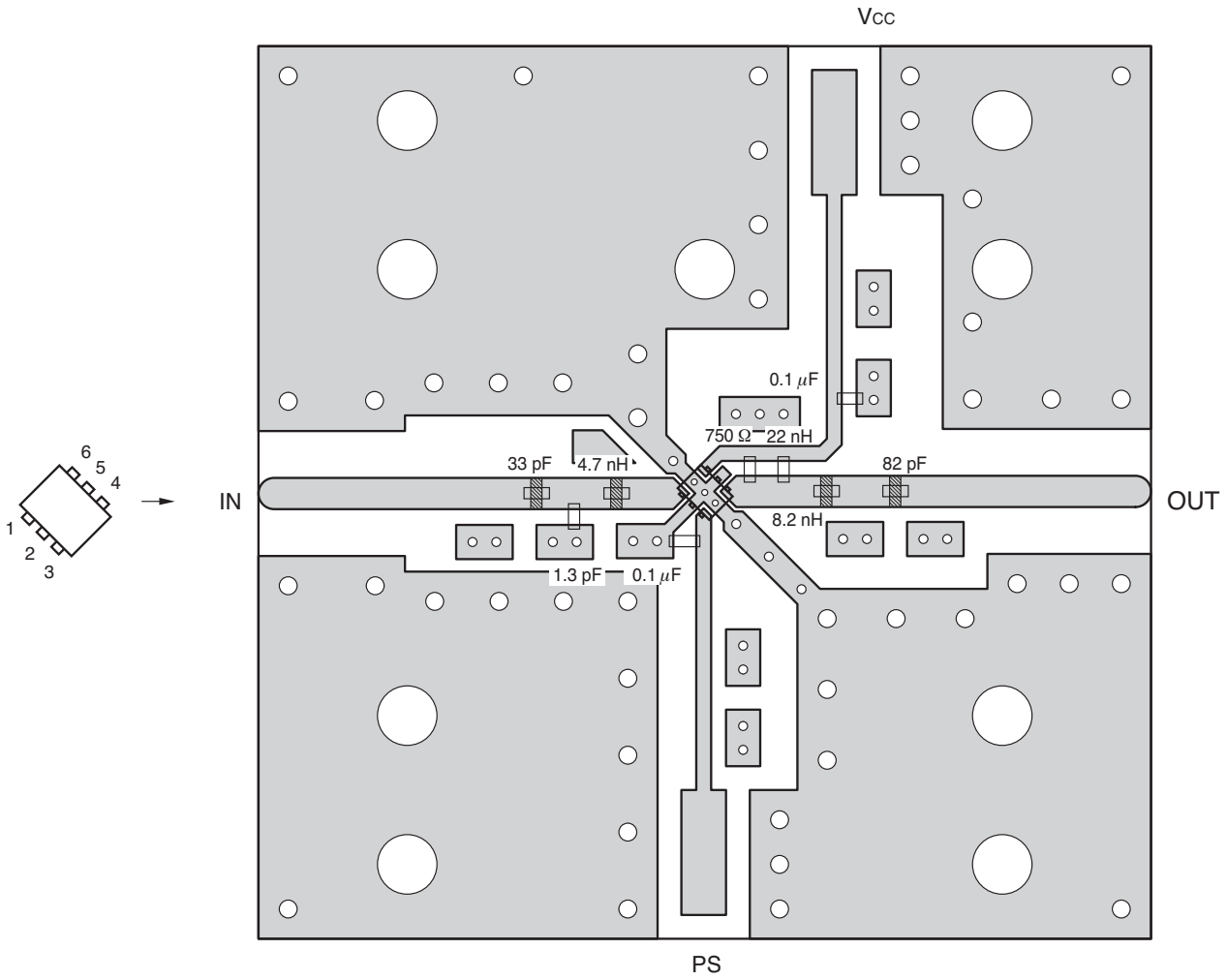
★ TEST CIRCUIT



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

Symbol	Form	Rating	Part Number	Maker
C_1, C_4	Chip Capacitor	0.1 μF	GRM36	Murata
C_2	Chip Capacitor	1.3 pF	GRM36	Murata
C_3	Chip Capacitor	33 pF	GRM36	Murata
C_5	Chip Capacitor	82 pF	GRM36	Murata
R_1	Resistor	750 Ω	RR0816	Susumu
L_1	Inductor	4.7 nH	TFL0510	Susumu
L_2	Inductor	22 nH	TFL0816 or TFL0510	Susumu
L_3	Inductor	8.2 nH	TFL0510	Susumu

ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

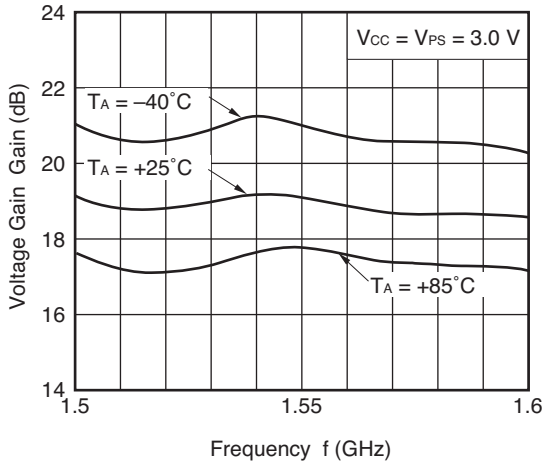


Notes

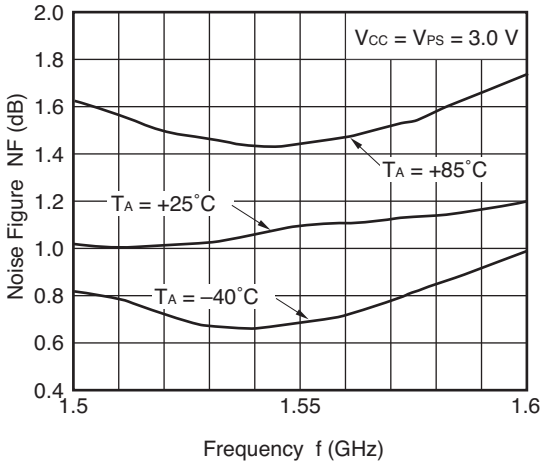
1. 30 × 30 × 0.51 mm double-side copper-clad hydrocarbon ceramic woven glass PWB (Rogers: R04003, εr = 3.38).
2. Back side: GND pattern
3. Au plated on pattern
4. ▨ represents cutout
5. ○: Through holes

TYPICAL CHARACTERISTICS (T_A = +25°C, unless otherwise specified)

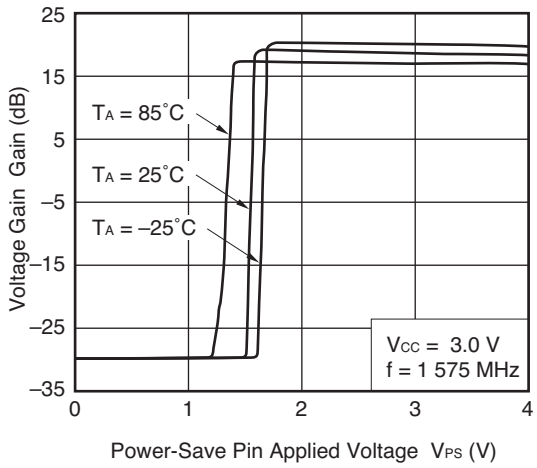
VOLTAGE GAIN vs. FREQUENCY



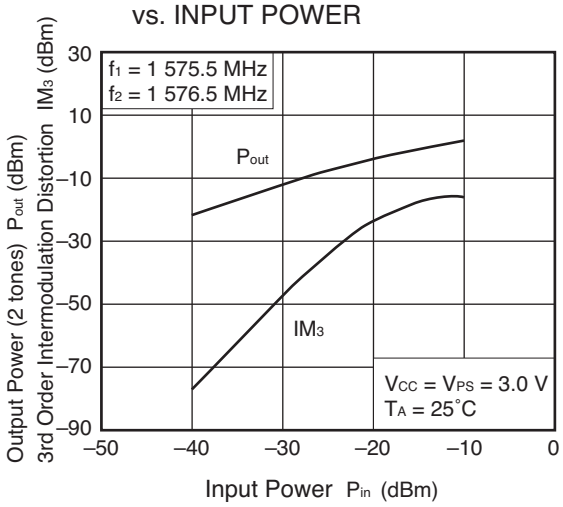
NOISE FIGURE vs. FREQUENCY



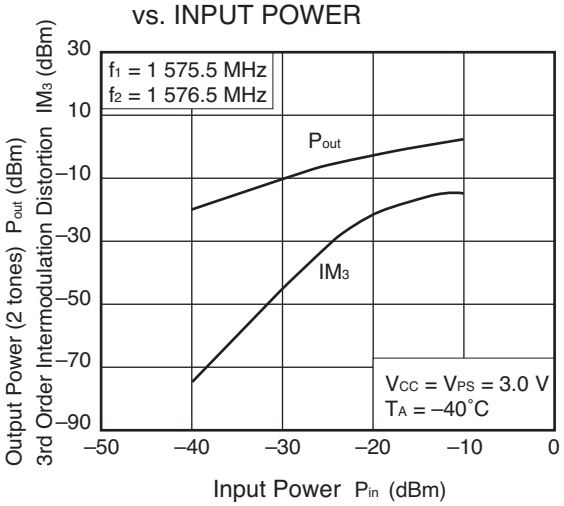
VOLTAGE GAIN vs. POWER-SAVE PIN APPLIED VOLTAGE



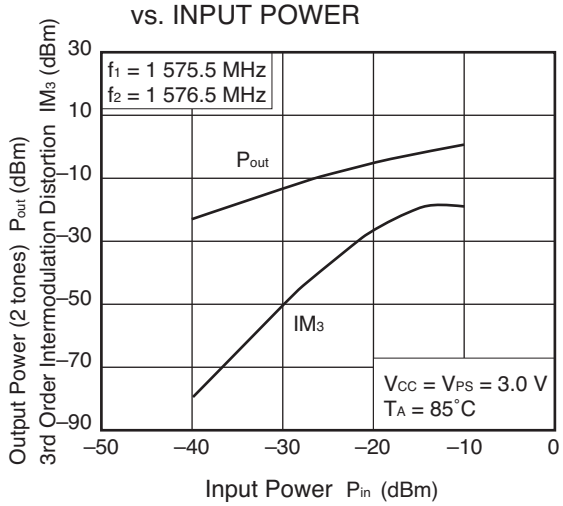
OUTPUT POWER (2 tones), IM3 vs. INPUT POWER



OUTPUT POWER (2 tones), IM3 vs. INPUT POWER



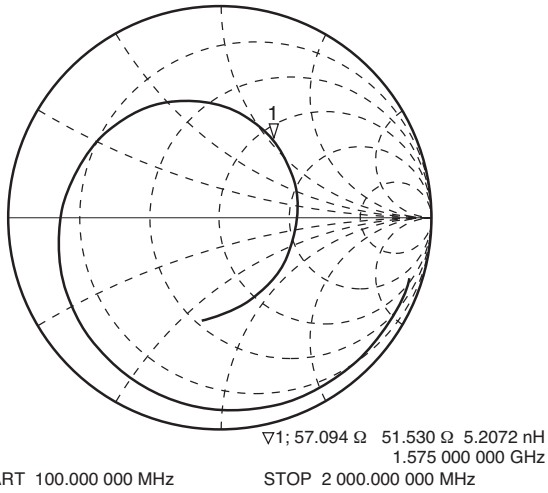
OUTPUT POWER (2 tones), IM3 vs. INPUT POWER



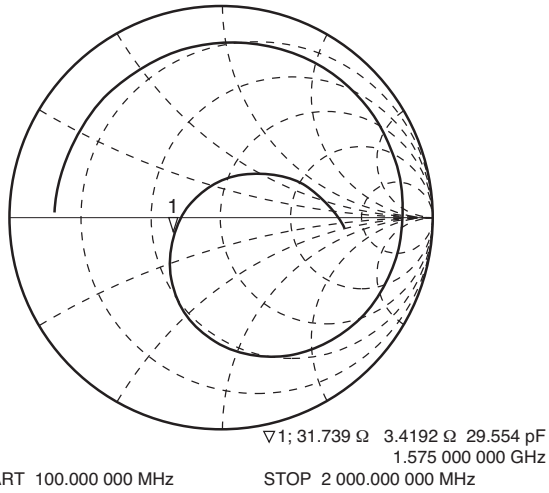
Remark The graphs indicate nominal characteristics.

S-PARAMETERS (T_A = +25°C, V_{CC} = V_{PS} = 3.0 V, monitored at connector on board)

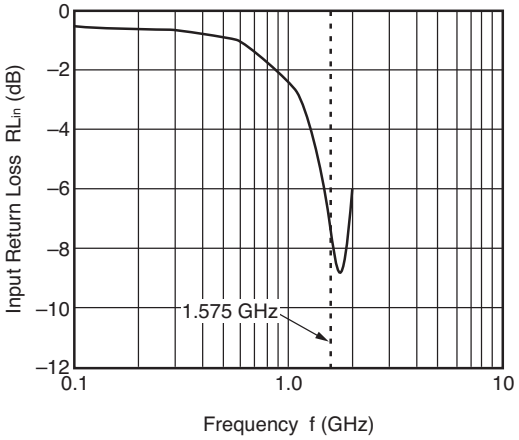
S_{11}-FREQUENCY



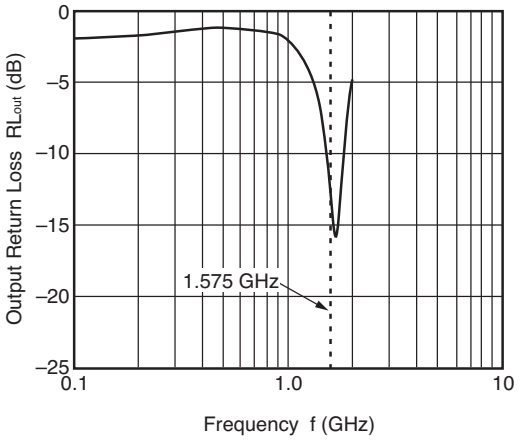
S_{22}-FREQUENCY



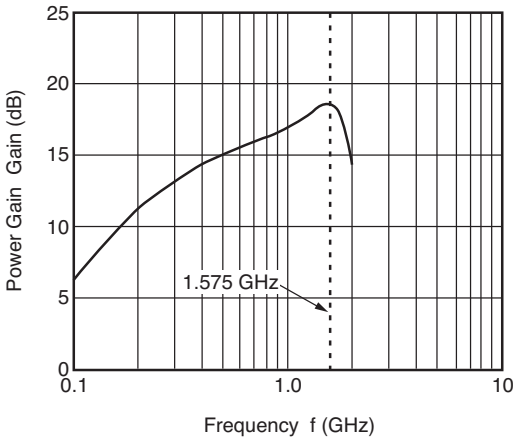
INPUT RETURN LOSS vs. FREQUENCY



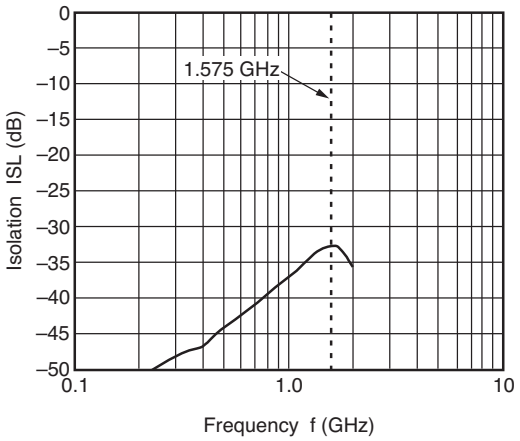
OUTPUT RETURN LOSS vs. FREQUENCY



POWER GAIN vs. FREQUENCY



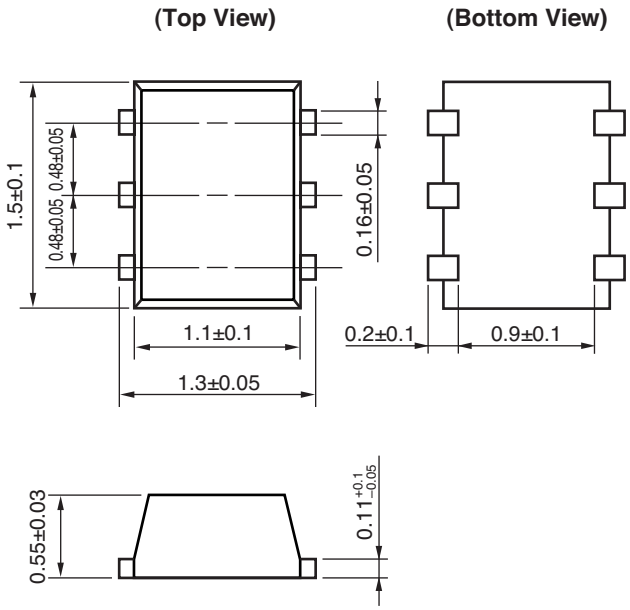
ISOLATION vs. FREQUENCY



Remark The graphs indicate nominal characteristics.

PACKAGE DIMENSIONS

6-PIN LEAD-LESS MINIMOLD (1511 PKG) (UNIT: mm)



Remark ( ) : Reference value

NOTES ON CORRECT USE

(1) Observe precautions for handling because of electro-static sensitive devices.

(2) Form a ground pattern as widely as possible to minimize ground impedance (to prevent undesired oscillation). All the ground terminals must be connected together with wide ground pattern to decrease impedance difference.

(3) The bypass capacitor should be attached to V_{CC} line.

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

Soldering Method	Soldering Conditions		Condition Symbol
Infrared Reflow	Peak temperature (package surface temperature) Time at peak temperature Time at temperature of 220°C or higher Preheating time at 120 to 180°C Maximum number of reflow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 60 seconds or less : 120±30 seconds : 3 times : 0.2%(Wt.) or below	IR260
Wave Soldering	Peak temperature (molten solder temperature) Time at peak temperature Preheating temperature (package surface temperature) Maximum number of flow processes Maximum chlorine content of rosin flux (% mass)	: 260°C or below : 10 seconds or less : 120°C or below : 1 time : 0.2%(Wt.) or below	WS260
Partial Heating	Peak temperature (terminal temperature) Soldering time (per side of device) Maximum chlorine content of rosin flux (% mass)	: 350°C or below : 3 seconds or less : 0.2%(Wt.) or below	HS350

Caution Do not use different soldering methods together (except for partial heating).

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  "Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

  "Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

  "Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

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M8E 00. 4 - 0110

▶For further information, please contact

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0504

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No. 3, Industrial 2nd Rd., Ping-Chen Industrial District,
Taoyuan, 324, Taiwan, R.O.C.
TEL: 886-3-4690038 FAX: 886-3-4697532
E-mail: tstsales@mail.taisaw.com Web: www.taisaw.com

Product Specifications Approval Sheet

Product Description: SAW Filter 1590 MHz SMD 3.0X3.0 mm

TST Part No.: TA0638A

Customer Part No.:_____

Customer signature required

Company:_____

Division:_____

Approved by :_____

Date:_____

Checked by:_____ Bob Chau _____

Approved by:_____ Francis Chen _____

Date:_____ 7, 21, 2009 _____

1. Customer signed back is required before TST can proceed with sample build and receive orders.
2. Orders received without customer signed back will be regarded as agreement on the specifications.
3. Any specifications changes must be approved upon by both parties and a new revision of specifications shall be released to reflect the changes.

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SAW Filter 1590MHz

MODEL NO.:TA0638A REV. NO.:2

A. MAXIMUM RATING:

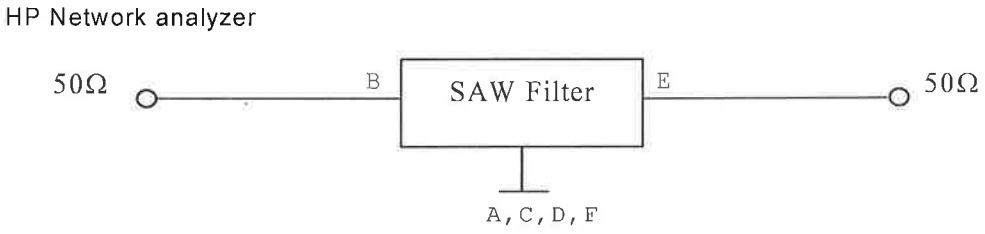
1. Input Power Level: 10 dBm
2. DC Voltage : 3V
3. Operating Temperature: -55°C to +85°C
4. Storage Temperature: -55°C to +95°C

RoHS Compliant
Lead free
Lead-free soldering

B. ELECTRICAL CHARACTERISTICS:

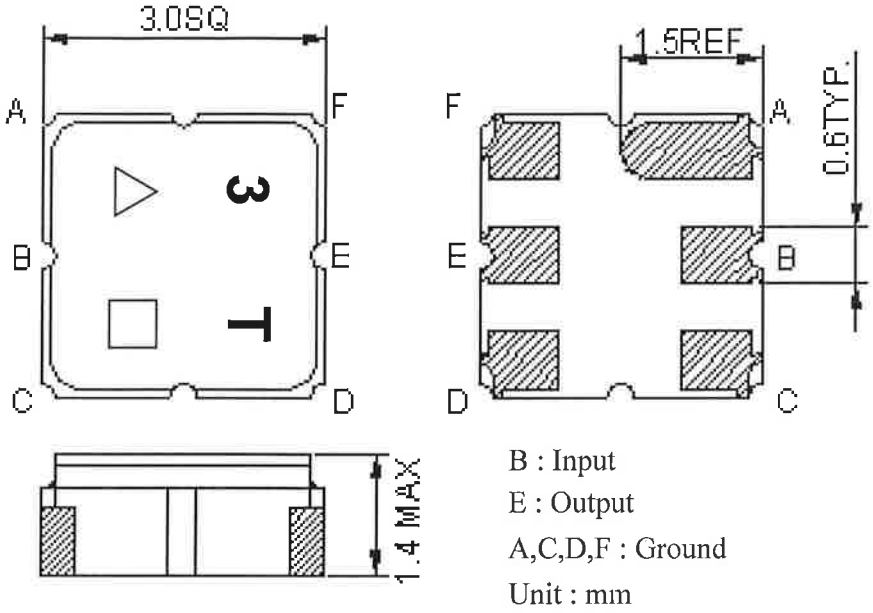
Item		Unit	Min.	Type.	Max.	Note
Center Frequency	Fc	MHz	-	1590	-	-
Min. Insertion Loss	IL	dB	-	2.3	4	-
Amplitude ripple		dB	-	1	1.8	-
Bandwidth @ -1.2dB		MHz	55	59	65	-
Bandwidth @ -20dB		MHz	-	97	125	-
Ultimate rejection		dB	-	50	-	-

C. MEASUREMENT CIRCUIT:



E13*10R00*10R04*13377*00
Société Nationale de Certification et d'Homologation
L-5201 SANDWEILER (Luxembourg)
Organisme accrédité OLAS EN 45011
Accréditation N° 5/001 (Portée communiquée sur demande)

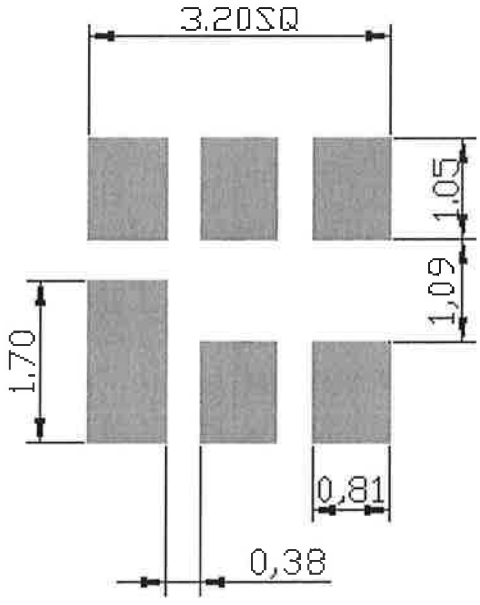
D.OUTLINE DRAWING:



B : Input
E : Output
A,C,D,F : Ground
Unit : mm

△ : Year Code (2006->6, …, 2009->9)
□ : Date Code (W01->A,W02->B,…W27->a,…,W52->z)

E. PCB Footprint:



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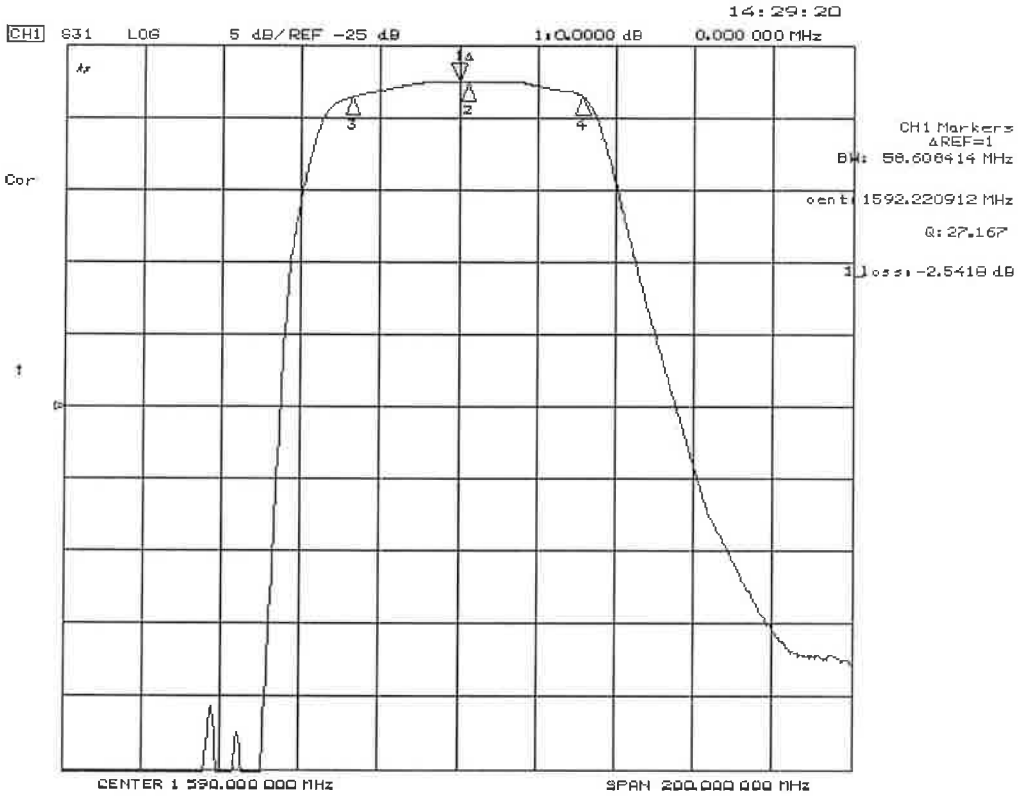
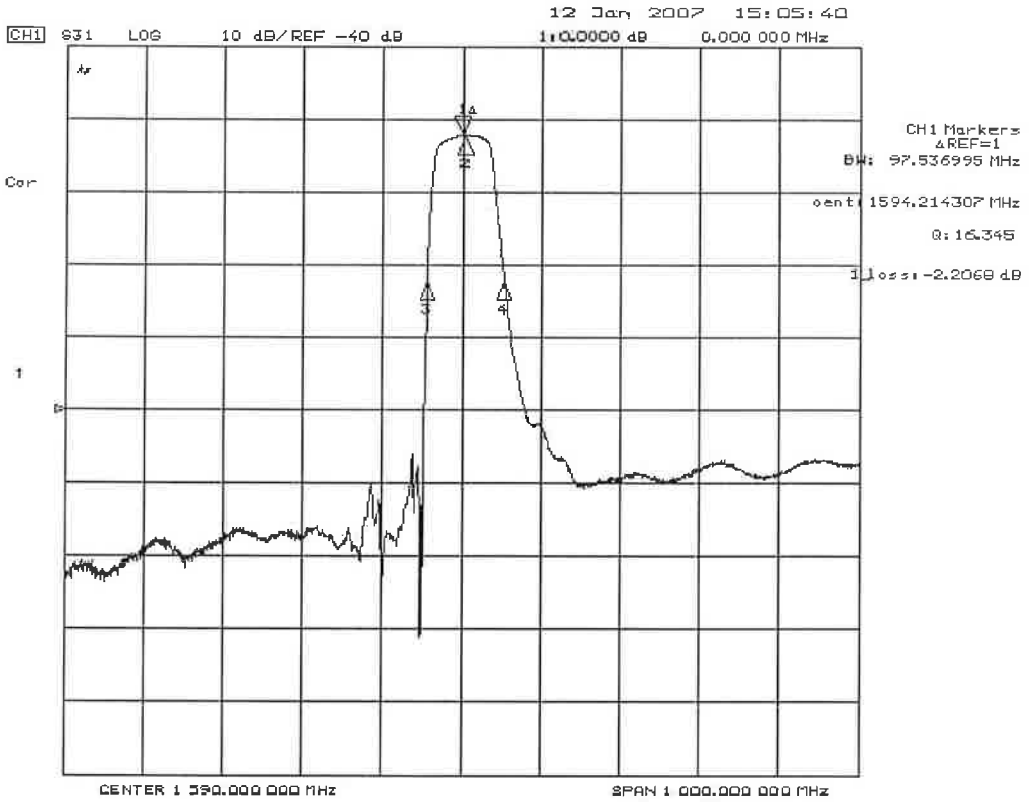
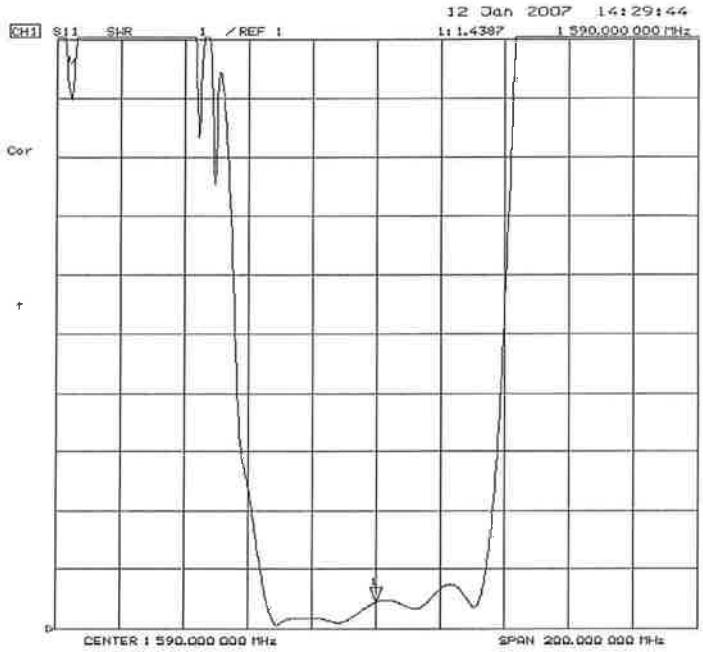
F. Frequency Characteristics :



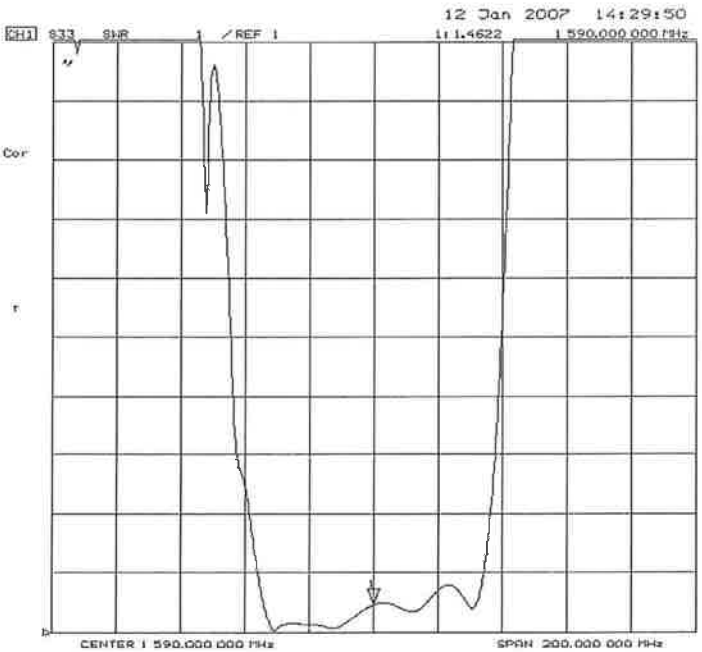


Reflection Functions :

S11



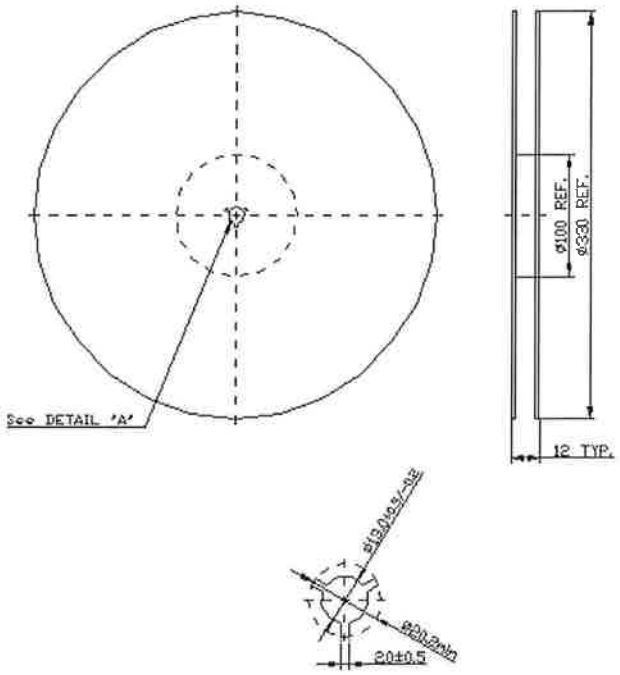
S22



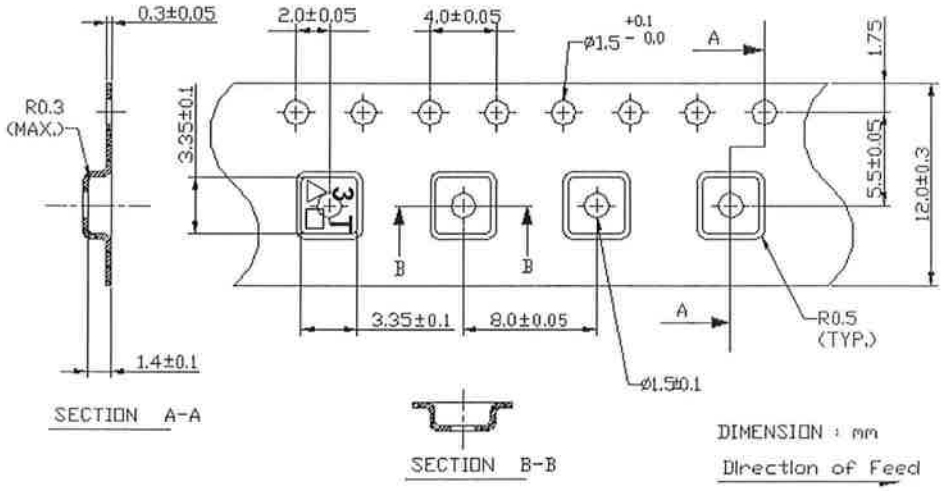
G. PACKING:

1. REEL DIMENSION

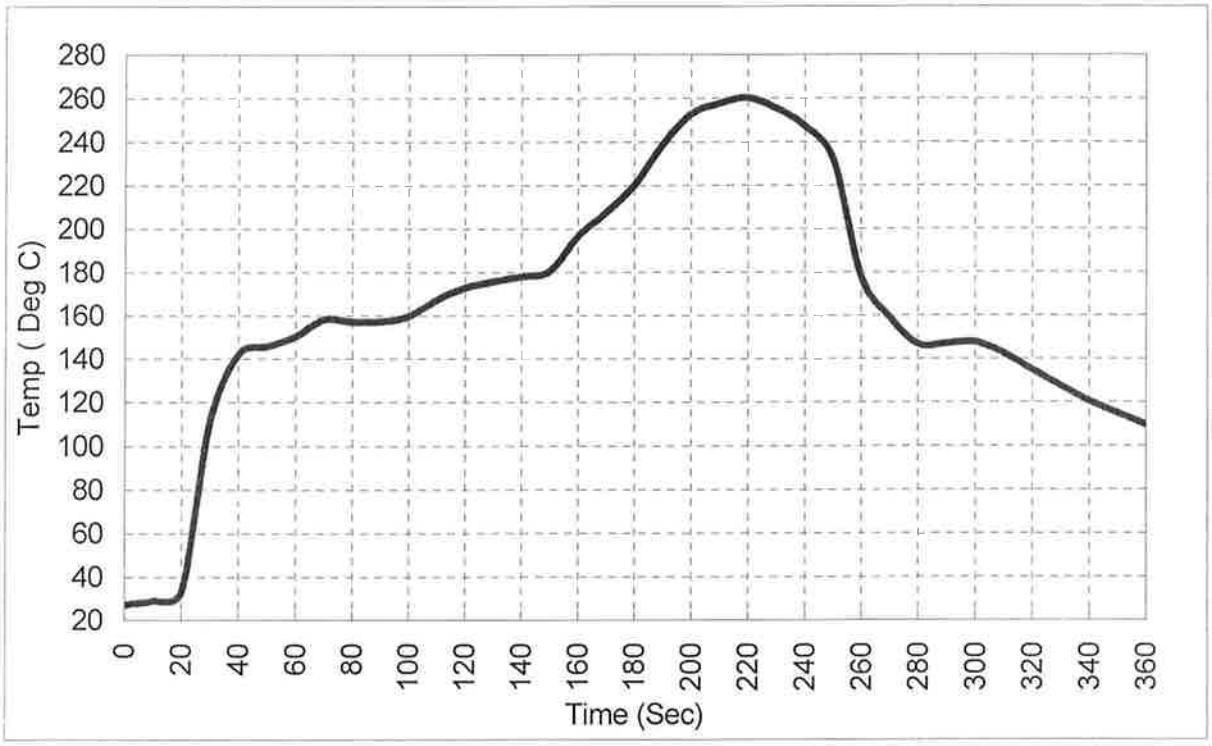
(Reel Count : 7"=1000 ; 13"=3000)



2.TAPE DIMENSION



H. RECOMMENDED REFLOW PROFILE :



佳邦科技股份有限公司
INPAO Technology Co.,Ltd.

PATCH Sample Test Report

Ref. No.: RFN1240149 **Customer:Endrich-REEL** **Date:** 2012-4-18

P/N	PA1575MZ50J4G-17-16			Quantity	15 PCS
Item					
Test Item	Frequency	Impedance		Return Loss	Band width(S_{11}<-10)
	MHz	Ω	jΩ	dB	MHz
	1593±2			<-20	
1	1593.30			-31.4	
2	1593.30			-26.3	
3	1593.30			-29.5	
4	1593.00			-27.8	
5	1593.60			-27.4	
6	1593.60			-27.3	
7	1593.00			-27.8	
8	1593.00			-29.8	
9	1593.30			-28.9	
10	1593.00			-26.1	
11	1593.40			-25.5	
12	1593.00			-33	
13	1593.00			-28.1	
14	1593.60			-29.1	
15	1593.00			-28.4	
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RD Engineer: 陆正坤 **Approved:** 蒋金定