Panasonic

UN06A08

UMTS Band VIII Power Amplifier IC
(880MHz to 915MHz)

Applications
- WCDMA handset
- HSDPA
- HSUPA
- LTE

Outline
- PAMP09-N2

Type
- Hybrid Integrated Circuit

Features
- High efficiency operation at any power
  39% @ 28.5dBm
  35% @ 17dBm
  15% @ 7dBm
- Small, low profile package
  3mm x 3mm x 0.85mm (1mm Max)
- Low Voltage Positive Bias Supply
  (3.2V to 4.2V)
- 3-Mode Power States with Digital
  Control Interface
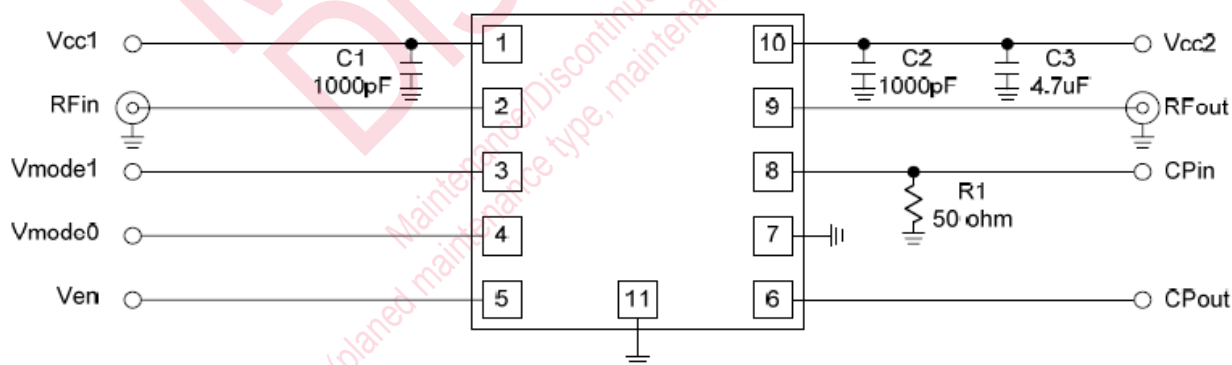- Integrated Power Coupler
- Integrated Blocking capacitors

Established: 2012-11-21
Revised:
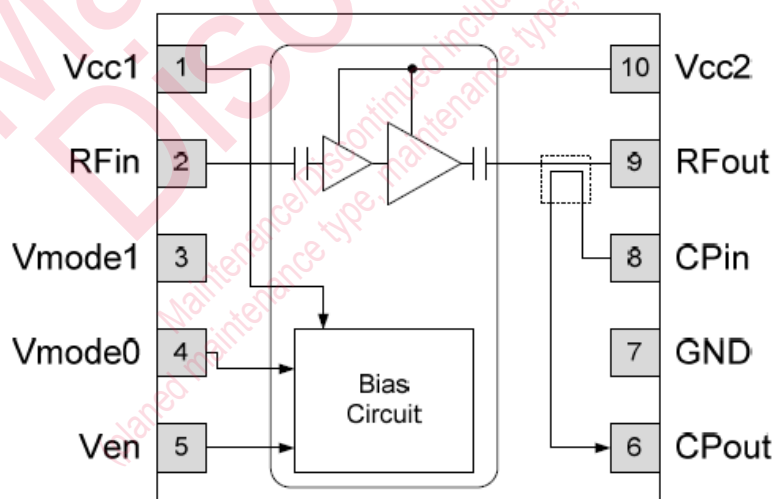
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■ Pin Assignment

Pin No.	Pin Name
1	Vcc1
2	RFin
3	Vmode1
4	Vmode0
5	Ven
6	CPout
7	GND
8	CPin
9	RFout
10	Vcc2
11	GND

TOP VIEW
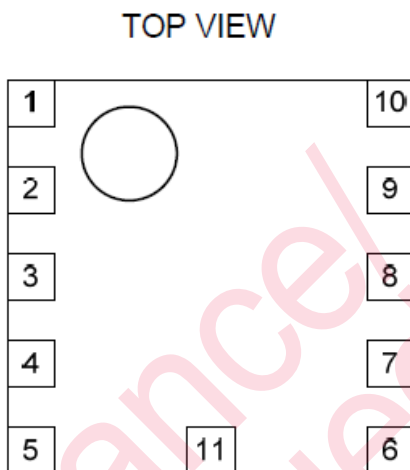
Note : Pin No.11 shows the central terminal at the bottom package.

■ Recommended Circuit

C1 : 1000pF to 0.1uF (Set up C1 from the terminal Vcc1 to the distance within 1mm.)
C2 : 1000pF to 0.1uF (Set up C2 from the terminal Vcc2 to the distance within 1mm.)
C3 : 1uF to 4.7uF (Set up C3 from the terminal Vcc2 to the distance within 30mm.)
R1 : 50 ohm

Established: 2012-11-21
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■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit	Notes
Supply voltage	Vcc1,2	6	V	1,2
Control voltage	Ven, Vmode0, Vmode1	4.2	V	1
Input RF power	Pin	10	dBm	1,3
Storage temperature	Tstg	-35 to +150	°C	1

■ Operating Ranges

Parameter	Condition	Symbol	Min	Typ	Max	Unit	Notes
Operating Frequency			880		915	MHz	
Supply Voltage			3.2	3.4	4.2	V	
Enable Voltage	Low		0		0.5	V	
	High		1.35	1.8	3.1		
Mode Control Voltage	Low		0		0.5	V	
	High		1.35	1.8	3.1		
Case Temperature (Tc)	UMTS / LTE		-20		85	°C	
	CDMA		-30		85		

■ Modes of operation

Parameter	Ven	Vmode0	Vmode1	Pmax		
				Rel99	HSPA	LTE
High-power mode(HPM)	High	Low	Low	≤ 28.5	≤ 27.25	≤ 27.25
Medium-power mode(MPM)	High	High	Low	≤ 17	≤ 16	≤ 16
Low-power mode(LPM)	High	High	High	≤ 7	≤ 6	≤ 6
Shut down mode	Low	Low	Low	-	-	-

Established: 2012-11-21
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■ Electrical performance-1

Vcc=3.4V, Ven=1.8V, Ta=+25℃, ZS=ZL=50Ω
f=880 to 915MHz   Signal Condition:Rel99

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
Gain	G1	HPM, Pout=28.5dBm MPM, Pout=17dBm LPM_Pout=7dBm	25.0	29.0 16.0 10.0		dB	
Total Supply Current	Ict	HPM, Pout=28.5dBm MPM, Pout=17dBm LPM, Pout=7dBm		539 41 9		mA	
Power Added Efficiency	PAE	HPM, Pout=28.5dBm MPM, Pout=17dBm LPM, Pout=7dBm		39 35 15		%	
Adjacent channel leakage power ratio1	ACLR1	5MHz offset HPM, Pout=28.5dBm MPM, Pout=17dBm LPM, Pout=7dBm		-41	-36	dBc	4
Adjacent channel leakage power ratio2	ACLR2	10MHz offset HPM, Pout=28.5dBm MPM, Pout=17dBm LPM, Pout=7dBm		-54	-46	dBc	4
Quiescent current	Iidle2	Vcc=3.4V, Pin=off,Ven=1.8V Vmod0=1.8V, Vmod1=1.8V		3.7		mA	
Mode0 control current	Imode0				0.1	mA	
Mode1 control current	Imode1				0.1	mA	
Enable current	Ien				0.1	mA	
Leakage Current	Ioff	Vcc=3.4V, Pin=off,Ven=0V		5	10	µA	
2nd harmonic	2f0	HPM, Pout=Pmax		-41	-35	dBc	
3rd harmonic and higher	3f0	HPM, Pout=Pmax		-42	-37	dBc	
Input impedance VSWR	ρIN	HPM, Pout=Pmax		2:1	2.5:1		

■ Electrical performance-2

Vcc=3.4V, Ven=1.8V, Ta=+25℃, ZS=ZL=50Ω
f=880 to 915MHz   Signal Condition:HSPA

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
Adjacent channel leakage power ratio3	ACLR3	5MHz offset Pout = Pmax-MPR		-41	-36	dBc	4
Adjacent channel leakage power ratio4	ACLR4	10MHz offset Pout = Pmax-MPR		-55	-46	dBc	4

Established: 2012-11-21
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■ Electrical performance-3

Vcc=3.4V, Ven=1.8V, Ta=+25℃, ZS=ZL=50Ω
f=880 to 915MHz   Signal Condition:LTE

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
Adjacent channel leakage power ratio7	ACLR7	E-UTRA_ACLR Pout ≤ Pmax-MPR		-39	-33	dBc	4,5
Adjacent channel leakage power ratio8	ACLR8	UTRA_ACLR1 Pout ≤ Pmax-MPR		-41	-36	dBc	4,5
Adjacent channel leakage power ratio9	ACLR9	UTRA_ACLR2 Pout ≤ Pmax-MPR		-47	-39	dBc	4,5

■ Electrical performance-4

Vcc=3.4V, Ven=1.8V, Ta=+25℃
f=880 to 915MHz

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
stability, spurious levels	S	Pout ≤ Pmax VSWR ≤ 5:1, all phase			-60	dBc	
Ruggedness	R	Pout ≤ Pmax all phase			8:1	VSWR	

■ Electrical performance-5

Vcc=3.4V, Ven=1.8V, Ta=+25℃, ZS=ZL=50Ω
f=880 to 915MHz

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
RX noise	NP1	Pout ≤ Pmax 45 MHz offset from Tx			-132	dBm/Hz	4
GPS noise	NP2	Pout ≤ Pmax 1574 – 1577 MHz			-135	dBm/Hz	4
ISM noise	NP3	Pout ≤ Pmax 2400 – 2483.5 MHz			-135	dBm/Hz	4

Established: 2012-11-21
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■ Electrical performance-6

f=880 to 915MHz

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
Coupler factor	CF		19	20	21	dB	
Daisy-chain insertion loss	DCil	CPL_IN to CPL_OUT ports, 698 – 2620 MHz, Enable = low		0.1	0.25	dB	

■ Electrical performance-7

Vcc=3.4V, Ven=1.8V, Ta=+25℃, ZS=ZL=50Ω

f=880 to 915MHz   Signal Condition:Rel99

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Notes
Phase discontinuity variation	Pdv	Part to part variation	-10		10	deg	

Notes

1: The backside ground of the package should be soldered to cellular phone P.C.B.

2: Ven=0V

3: Vcc1=Vcc2=3.4V, Ven=2.9V, Vmode0=0V, Vmode1=0V, RL=50Ω

4: RF measurements shall be made with 3GPP TS25.101 (UTRA/FDD UE) and TS36.101 (LTE) specification compliant waveforms.

  a. MPR is the maximum power reduction, as defined by the 3GPP specifications.
   In case of using waveforms with a higher peak-to-average ratio, MPR shall be applied. (ranging from 0 to 2.5 dB)

  b. The worst-case MPR = 0 dB waveforms across the 3GPP specifications are required to meet a 1.25 dB lower maximum power than 3GPP TS25.101 Rel99 case.

5: The LTE ACLR test is as defined in TS36.101, Section 6.6.2.3.

  a. The minimum requirement of E-UTRA$_{ACLR}$ is defined in Section 6.6.2.3.1.

  b. The minimum requirement of UTRA$_{ACLR}$ is defined in Section 6.6.2.3.2.

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■ Marking
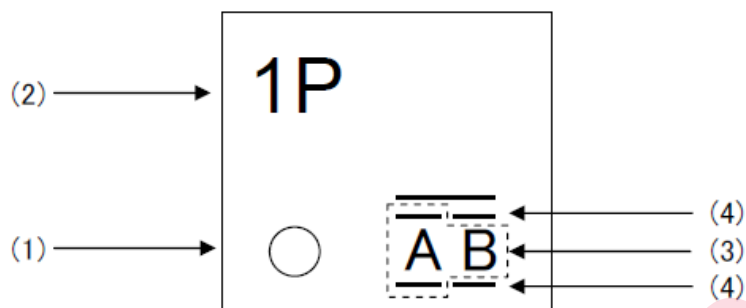
(1) Pin No.1

(2) Product Name

　1P : 1P shows UN06A08

(3) Lot No.

$\overline{A}$ B

　A: 1 to 9, A to Z and the top and bottom bar are jointly used.
　(However, neither I, O nor Q are used)
　B: A to Z are jointly used. (However, neither I, O nor Q are used)

(4) Product Year
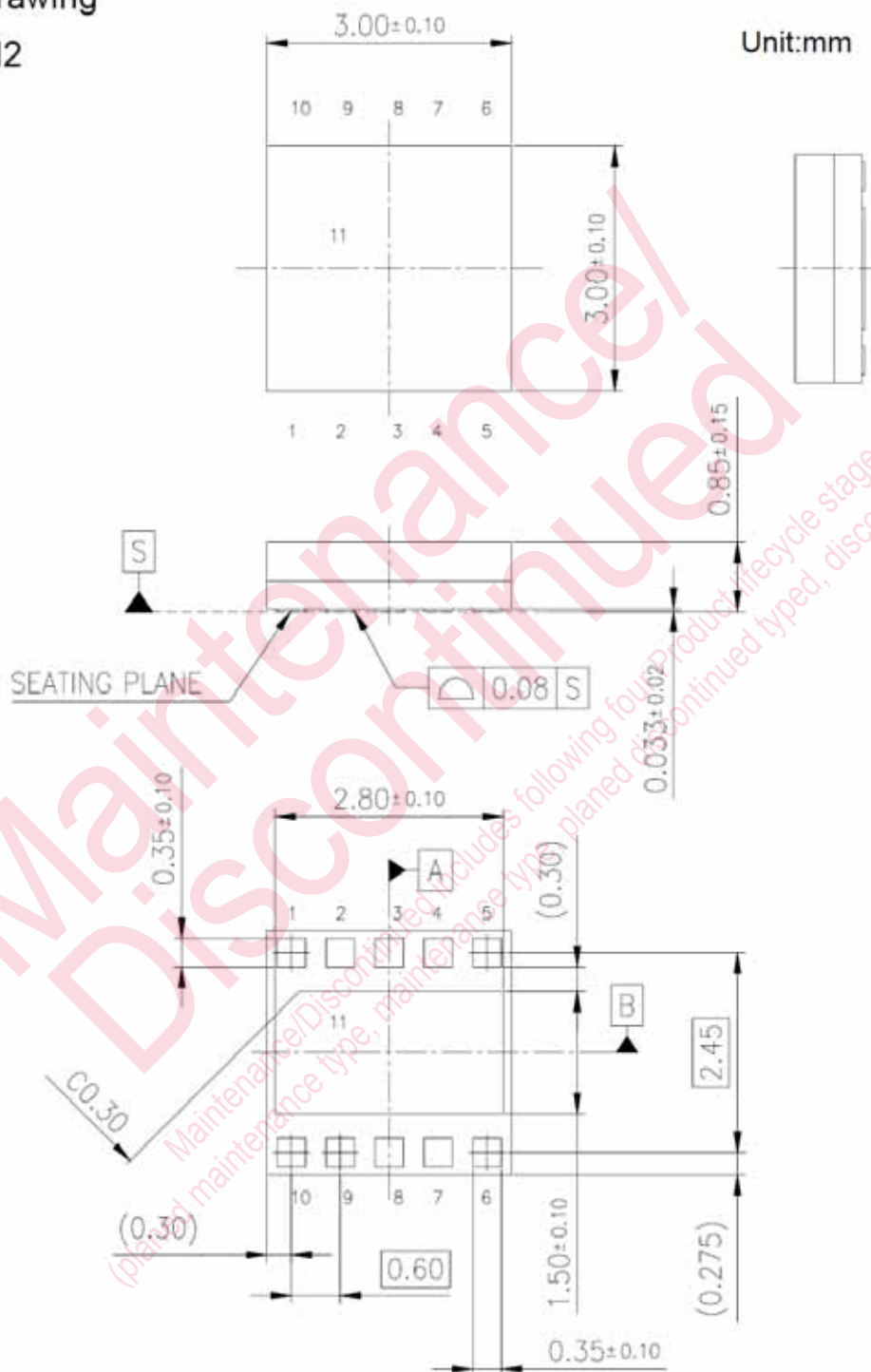Product year is shown by an upper and lower bar.

bar		year
A$\overline{\underline{B}}$	Upper and lower bar	2012
A$\overline{B}$	Upper bar	2013
AB	without bar	2014
A$\underline{B}$	Lower bar	2015

It uses after 2016 repeatedly from the upper and lower bar.

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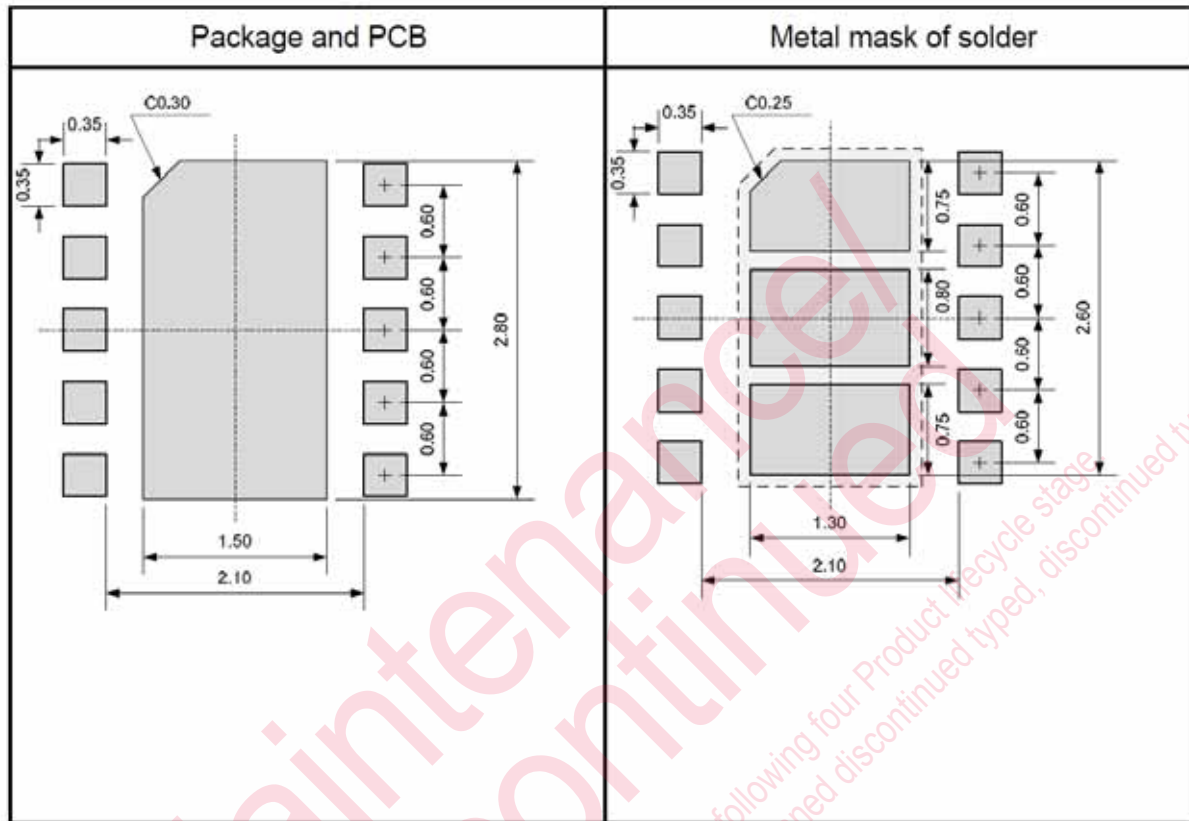Revised:

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■ Outline Drawing
PAMP09-N2

Unit:mm

Body Material	: Epoxy Resin
Substrate Material	: Halogen Free Organic Substrate
Terminal Finish Method	: Electroless Au plating

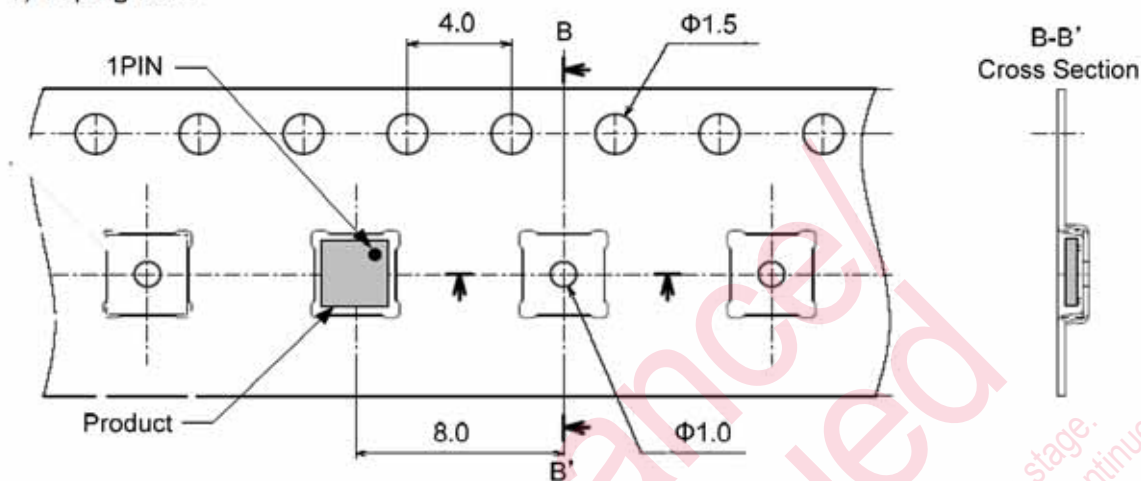Established: 2012-11-21
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■ Recommended land pattern

Package and PCB	Metal mask of solder

Established: 2012-11-21
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■ Packing figure

1) Taping form

- 4.0
- B
- Φ1.5
- 1PIN
- B-B' Cross Section
- Product
- 8.0
- B'
- Φ1.0

2) Reel form

- C3 label
- Cover
- Reel
- Carrier Tape
- Label
- Process control label
- 180
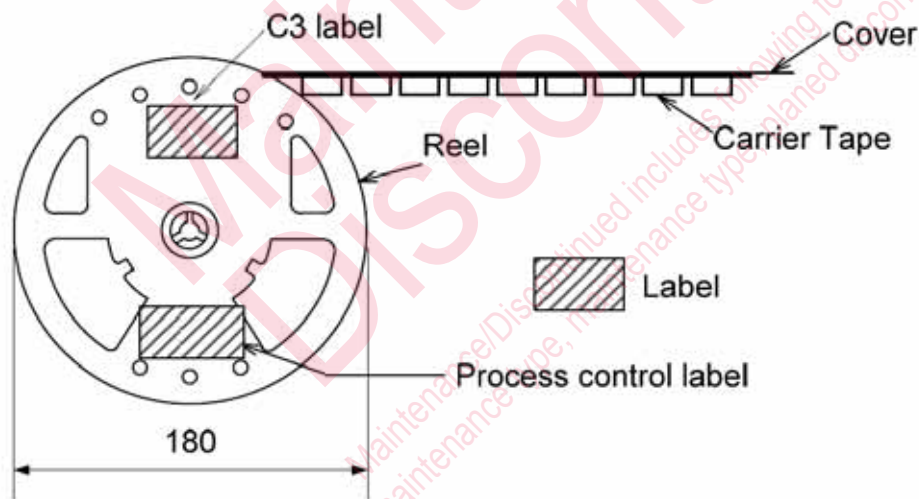
Reel, Carrier Tape and Covered Tape is antistatic treatment.
The lack of the product is not permitted.

Established: 2012-11-21
Revised:

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■ Recommended reflow temperature profile in lead-free soldering

In reflow soldering process, exact temperature-cycle management is essential. We recommend pre-heating before soldering, so that you can prevent not only package damages or stains but also damages on a printed circuit board, and your process becomes stable.

The following shows our recommended reflow temperature profile.
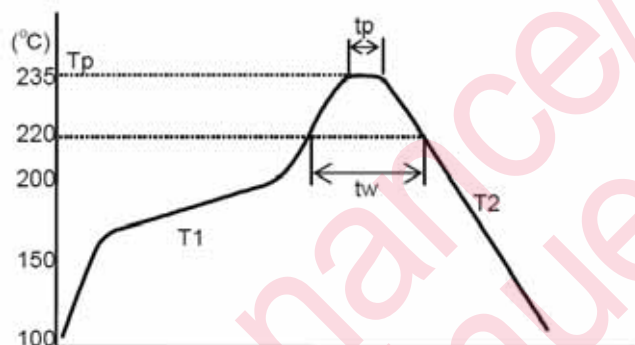
Pre-heating temp	T1	160℃ to 180℃, 1 to 2 minutes
Peak temp	Tp	Below 235℃
Heating time	tp	Below 10sec. (over 230℃)
Storage time in high temp	tw	Over 30sec. (over 220℃)
Cooling time	T2	Over 2minutes. (natural neglect in normal temperature)

Fig1 Solder wettability line
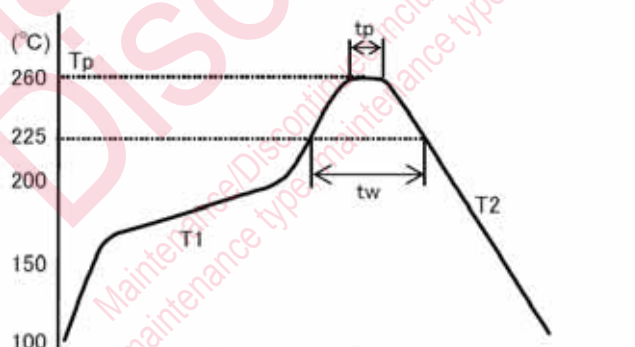
Pre-heating temp	T1	150℃ to 190℃, 1 to 3 minutes
Peak temp	Tp	Below 260℃
Heating time	tp	Below 10sec. (over 255℃)
Storage time in high temp	tw	30 to 70sec. (over 225℃)
Cooling time	T2	Over 2minutes. (natural neglect in normal temperature)
Cooling time		2 times

Fig2 Solder heat resistance line

Note1 : Specified temperature is package surface temperature.
Note2 : N2 reflow is available.
Note3 : Available solder is Sn-3.0Ag-0.5Cu.

Established: 2012-11-21
Revised:

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■ Notes on handling

1 Please, be fully careful of sudden heat, rapid cooling, and local heating, because this product is made by the resin board and the epoxy resin on structure. Please don't use the product dropped from higher place, because there is a risk of damage about the resin used in low elastic modulus by fall, a shock and so on.

2 Please, don't touch Au plating area of product by bare hand, and don't hurt, because Au is plated on the product electrode as exterior plating.

3 You must finish mount and reflow soldering within seven days after opening the dry pack in order to prevent exposure of moisture. Please keep the product at the atmosphere of the temperature from 5°C to 30°C and the humidity from 30%RH to 70%RH. Please keep the product in stable place of temperature and humidity without corrosive gas. If you keep product in that stable place, you may mount and reflow soldering in three months.

4 Please prevent product from an excessive stress when you mount to a print board, Moreover, please avoid the mechanical chucking of a product.

5 Although it is impossible to use the strong acid as the solder flux, it is possible to use the one of a rosin material. The method of reflow soldering is our recommendation. Please refer a temperature profile of reflow soldering as shown in Fig. 1 at the page 15 of this document. In addition, please refer a recommendation of land pattern as shown in the figure of the page 13 of this document.

6 Please don't carry out washing using a solvent after reflow soldering. also by ultrasonic wave cleaning.

7 Please be careful not to expose product static electricity, serge, etc.

Established: 2012-11-21
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■ Handling of dry packed products

1. Adaptation
In order to realize stable soldering, We ship this product with dry packing. Please take care with the following point, when you use dry packed products.

2. The storage conditions of a product
Be careful enough of storage environment irrespective of opening or un-opening. The product storage should avoid getting wet, corrosive gas, and fire.

[Recommended storage environment]
Temperature : 5 to 30 ℃
Humidity : 30 to 70%RH
Period : Less than 1 year
(Within 1 year after the manufacture date code of C3 label)

3. Handling after opening dry packing
In order to avoid the moisture absorption to a product, after opening dry packing should finish mounting and reflow soldering altogether within regulation time.

[The period which can be after opening dry packing]
Period : 7 + 7 days
In the case of storage in recommended storage environment

<Attention>
Packing specification of this product is taping.
Taping material is not heat-resistant materials.
Therefore, you must finish mount and reflow soldering within regulation time.
Unavoidably If you can't finish within regulation time, you must bake the products by low-temperature baking conditions.

4. Low-temperature baking conditions
Please carry out product re-dryness in the taping state on the following conditions.

[Low-temperature baking conditions]
Temperature : 40℃±5℃
Humidity : Less than 25%RH
Time : 192 hours
Number of times : 1 time

Established: 2012-11-21
Revised:

⚠️Caution for Safety

⚠️DANGER	■ **This product contains Gallium Arsenide (GaAs).** GaAs powder and vapor are hazardous to human health if inhaled or ingested. Do not burn, destroy, cut, cleave off, or chemically dissolve the product. Follow related laws and ordinances for disposal. The product should be excluded from general industrial waste or household garbage.

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