A Simple Multipliers /Mixers for 47GHz and 78GHz

By Norio Ueshima JR3JZM

I am very interested in Millimeter wave products especially for 47GHz and 78GHz band so I have decided to make two prototypes by myself. Generally its very difficult to handle Millimeter wave band products due to lots of cost. In that point DB6NT's PCB was very useful to me

Multiplier and Mixer

Those PCBs made by DB6NT

You can get those PCBs easily through his web site.
(http://www.kuhne-electronic.de/)
Next problem was how to get Diodes for Multipliers And mixers in my hands. In my case, I got the Diodes from Hp and Maycom company.
(It costs around $15 to $50)
And next issue was how to design and make the aluminum case .
I have tried to make the case as simple as possible in order that anyone makes the case with easy if he wants.
Regarding the milling case, I am a very lucky man because I have a good friend with high level of skill who has a small machining shop in Korea.
How to make them: You should be very careful about the adhesion since the PCB is very thin.
I used a bond with high conductivity.
This bond is made in USA.
(Conductive Epoxy CW2400, www.chemtronics.com)
After bonding ,Please attach the Diode to the PCB.
It is the most important process in this job.
How to bond the Diode: The Diode size is 0.2×0.6mm.
Wow! It looks like dust. Can you bond dusts to the PCB?

1. Put the bond on the Strip Line.

You must put particle bond on the Strip line.
At this point, you put bond as particle as possible.
If you put much bond on the Strip Line, You can't get success.

2. Put the Diode on the Strip line.

Next step, how to bond the Diode. You take out the Diode by using needle made by bamboo and put the Diode on the Strip line.
You move the Diode position to center of the Line and please wait approximately four hours.
Then it will be completed and you will be satisfied with the result.

Case for the Multiplier & Mixer

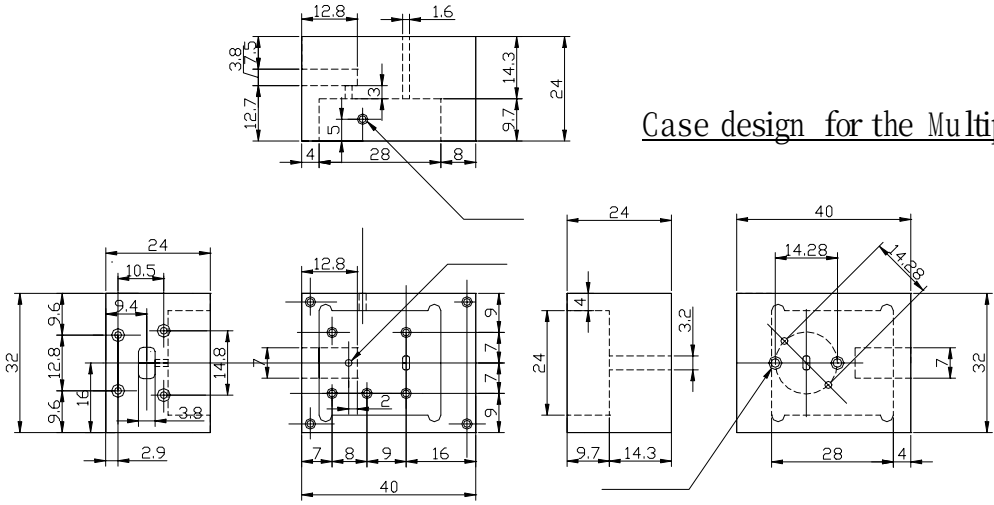
Measurement

Multiplier

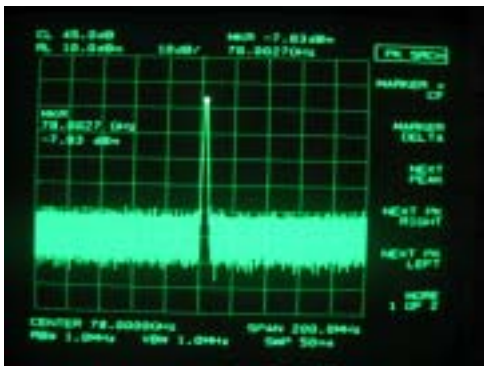
	78GHz	47GHz
Lo power	+20dBm	+20dBm
Lo frequency	39GHz	23.5GHz
Diode bias	1k ohm VR	1k ohm VR
Diode	MA4E2037 Single Beam lead	
Tx power	+5dBm	+10dBm

Mixer

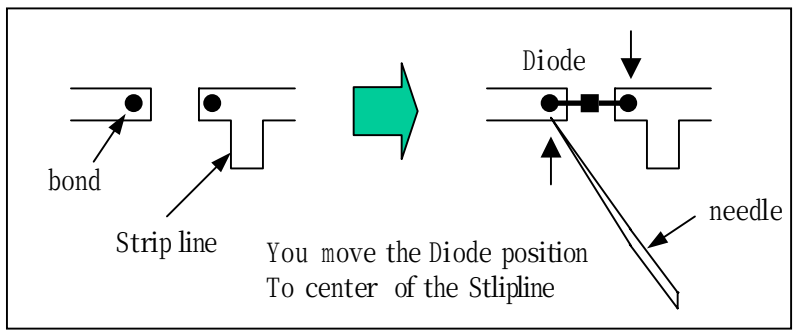
	78GHz	47GHz
Lo power	+20dBm	+20dBm
If frequency	1.2GHz	1.2GHz
Lo frequency	25.7GHz	15.3GHz
Diode bias	10k ohm VR	10k ohm VR
Diode	Hp HSCH-9251 Anti Parallel Beam lead	
Conversion Gain	-20dB	-12dB



Case design for the Multiplier & Mixer



78GHz Multiplexer



A 120Watts Power Amplifier for 900MHz,1.2GHz and 2.4GHz

900MHz 150W Power Amplifier

We found out Power FETs for a 150Watts covering the frequency range of 500MHz to 2.4GHz in Japan.
We made Power Amplifiers for 900MHz and 2.4GHz.
We will be willing to supply those FETs ,PCBs and Cases If you want. Lets try! 73!

Norio Ueshima JR3JZM
18-12,Takamatsu-cyo,Nishinomiya-city,Hyogo-ken,
663-8204 Japan.
E-mail jr3jzm@proof.ocn.ne.jp