An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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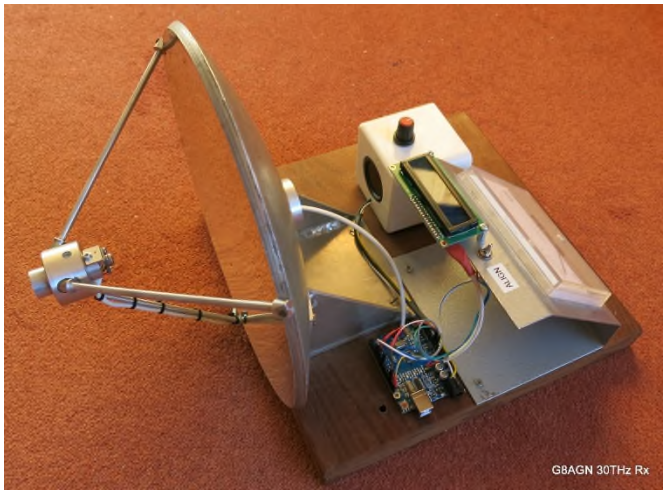
In This Issue



30THz receiver – Barry G8AGN


The shack of Clive GW4MBS

UK Microwave Group

Subscription Information

The following subscription rates apply

UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership**. For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via

https://groups.io/g/Scatterpoint and/or Dropbox. Also, **free access to the Chip Bank**

Please make sure that you pay the stated amounts when you renew your subs next time. If the amount is not correct your subs will be allocated on a pro-rata basis and you could miss out on a newsletter or two!

You will have to make a quick check with the membership secretary if you have forgotten the renewal date. Please try to renew in good time so that continuity of newsletter issues is maintained. Put a **renewal date reminder** somewhere prominent in your shack.

Please also note the payment methods and be meticulous with PayPal and cheque details.

PLEASE QUOTE YOUR CALLSIGN!

Payment can be made by: PayPal to

ukug@microwavers.org

or a cheque (drawn on a UK bank) payable to 'UK Microwave Group' and sent to the membership secretary (or, as a last resort, by cash sent to the Treasurer!)

Articles for Scatterpoint

News, views and articles for this newsletter are always welcome.

Please send them to

editor@microwavers.org

The CLOSING date is

the FIRST day of the month

if you want your material to be published in the next issue.

Please submit your articles in any of the following formats:

Text: txt, rtf, rtfd, doc, docx, odt, Pages

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

I can extract text and pictures from pdf files but tables can be a bit of a problem so please send these as separate files in one of the above formats.

Thank you for you co-operation.

Roger G8CUB

Reproducing articles from Scatterpoint

If you plan to reproduce an article exactly as in Scatterpoint then please contact the Editor – otherwise you need to seek permission from the original source/author.

UKµG Project support

The UK Microwave Group is pleased to encourage and support microwave projects such as Beacons, Synthesiser development, etc. Collectively UKuG has a considerable pool of knowledge and experience available, and now we can financially support worthy projects to a modest degree.

Note that this is essentially a small scale grant scheme, based on 'cash-on-results'. We are unable to provide ongoing financial support for running costs – it is important that such issues are understood at the early stages along with site clearances/licensing, etc.

The application form has a number of guidance tips on it – or just ask us if in doubt! In summary:-

- Please apply in advance of your project
- We effectively reimburse costs - cash on results (e.g. Beacon on air)
- We regret we are unable to support running costs

Application forms below should be submitted to the UKuG Secretary, after which they are reviewed/ agreed by the committee

www.microwavers.org/proj-support.htm

UKµG Technical support

One of the great things about our hobby is the idea that we give our time freely to help and encourage others, and within the UKuG there are a number of people who are prepared to (within sensible limits!) share their knowledge and, what is more important, test equipment. Our friends in America refer to such amateurs as “Elmers” but that term tends to remind me too much of that rather bumbling nemesis of Bugs Bunny, Elmer Fudd, so let’s call them Tech Support volunteers.

While this is described as a “service to members” it is not a “right of membership!”

Please understand that you, as a user of this service, must expect to fit in with the timetable and lives of the volunteers. Without a doubt, the best way to make people withdraw the service is to hassle them and complain if they cannot fit in with YOUR timetable!

Please remember that a service like our support people can provide would cost lots of money per hour professionally and it’s costing you nothing and will probably include tea and biscuits!

If anyone would like to step forward and volunteer, especially in the regions where we have no representative, please contact the committee.

The current list is available at

www.microwavers.org/tech-support.htm

UKµG Chip Bank – A free service for members

By Mike Scott, G3LYP

Non-members can join the UKµG by following the non-members link on the same page and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of components on the site will not be a guarantee of availability of that component.

The service is run as a free benefit to all members of the UK Microwave Group. The service may be withdrawn at the discretion of the committee if abused. Such as reselling of components.

There is an order form on the website with an address label which will make processing the orders slightly easier.

Minimum quantity of small components is 10.

These will be sent out in a small jiffy back using a second class large letter stamp. The group is currently covering this cost.

As many components are from unknown sources. It is suggested values are checked before they are used in construction. The UKµG can have no responsibility in this respect.

The catalogue is on the UKµG web site at
www. microwavers.org/chipbank.htm

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Loan Equipment

Don't forget, UKuG has loan kit in the form of portable transceivers available to members for use on the following bands: **Contact Neil G4DBN for more information**

5.7GHz 10GHz 24GHz 47GHz 76GHz

Report from Neil G4LDR

UK Microwave Group

Report to RSGB Spectrum Forum

Introduction to UK Microwave Group

The UK Microwave Group (UKuG) represents the interests of amateur radio enthusiasts who operate on frequencies above 1.0GHz. The UKuG is open to membership from both the UK and overseas microwavers. The current membership stands at 560 with about 50 new members joining in the last year.

Events supported during late 2019 and 2020

Normally a series of specialist amateur radio microwave meetings; Microwave Round Tables are organised by local radio clubs and societies and supported by the UKuG. Since the last Spectrum Forum meeting only two events were able to take place, December 2019 and March 2020, these were well supported.

Impact of COVID-19 on amateur microwaves in the UK.

There are three main areas where COVID-19 has impacted on UK microwaves. The first is the cancellation of all the Microwave Round Tables since March with little prospect of them resuming in the near future. This has meant members have not been able to meet in person and besides not being able to attend talks, have not had access to specialist test equipment to check or calibrate home brew or ex-commercial equipment. In addition members have not had access to the sale of surplus equipment, components or kits intended for home brew which are an important feature of each Round Table.

The second impact has been on operating. During the full lockdown period no portable operation was allowed. During contests and activity periods a significant number of operators have little choice but to go out to a local high spot to operate. It was encouraging to see a number of microwave operators set up home stations to at least have a few contacts. When full lockdown ended we saw a rapid return to portable operating. As we move towards the end of 2020 and the return of lockdown in England and similar measures in the other countries of the UK we once again there will be a curtailment of portable operating.

The third impact has been on our club and outreach activities. Luckily many local radio clubs now hold virtual meetings via zoom. Several of our members have given on-line takes to local clubs. The UKuG will begin its own series of on-line talks in November.

Technical Support and loan equipment

The UKuG loan systems for 5.7, 10, 24 and 76GHz have continued to be well used. A system for 47GHz will be available soon.
The group has continued to fund capital expenditure on new beacon projects. It is currently in contact with amateurs on the Cape Verde Islands to see what help and support they need to get equipment that can be used both as beacons and for potentially QSO's on the 23 and 3cm bands which take advantage of good tropospheric propagation conditions back to the UK and Europe that occur each summer.
During the last year the UKuG chip bank has continued to be popular with members. It is currently operating on an on-line order service only. Several large donations of components and other items have boosted and expanded stock.

Publications

UKuG members write several of the regular columns in RadCom, write for Practical Wireless and regularly contribute technical articles and the European activity reports for DUBUS magazine.

Scatterpoint

The e-newsletter of the Group, under the Editorship of Roger, G8CUB, is published at least ten times a year and continues to attract top-line technical articles as well as being a comprehensive repository of reports of activity.

Group web presence

The Group has established a Wiki, which continues to be populated with amateur microwave related material. The UKuG has an increasing number of microwave related videos on its YouTube video channel. The Twitter feed @UKGHZ attracts many likes and retweets. Beaconspot.UK is a valuable resource and archive of propagation conditions in the UK and across Europe.

- Web: http://www.microwavers.org/
- Wiki: https://wiki.microwavers.org.uk/
- Twitter: https://twitter.com/UKGHz
- YouTube: https://www.youtube.com/c/UKMicrowaveGroup

Operation

The amateur radio microwave bands continue be under threat from many different commercial radio organisations who would wish to use them for mobile broadband and other activities. Of particular concern at the moment is the future access to the 1.3GHz band. WRC19 agreed to studies being carried out to determine what protection systems like Galileo will need to provide uninterrupted service and whether amateur radio can continue to share the spectrum space.

Other microwave bands continue to be lost in other parts of the world, the latest being the 9cm in the USA from November next year.

Following publication of an article in DUBUS magazine in 2019 on simple 122GHz equipment based on short range radar chips and the world wide crowd funding of the production of systems pcbs, there has been a significant upsurge in the UK of the use of the band. Distance records are gradually being increased and different modulation techniques for voice and data are being investigated.

Awards

The UKuG presents a number of awards for achievement and contests winners. This year saw a new award presented in honour of the late Michel Walters G3JVL who was a pioneer in microwave equipment and microwave antenna design. The award went to Phil Boorman G0JBA for his significant achievements on the 24GHz band as a newcomer to that band.

Submitted by G4LDR on behalf of the UK Microwave Group, November 2020

30THz A new band to explore?

By Barry Chambers, G8AGN

Introduction

The ever-increasing demand for communication bandwidth is providing the impetus for the commercialisation of electromagnetic waves of ever higher frequencies; for example, OFCOM has already designated frequency bands above 100GHz for future 6G short range mobile communications systems. Radio amateurs have always been at the forefront of exploring and exploiting hitherto regarded "as useless" frequency bands and today is no exception. For some years now, radio amateurs have been exploring frequencies in the range 100 to 1000GHz (0.1 to 1THz) and in the band around 474THz (light waves). To put these frequencies into perspective, 1THz corresponds to a wavelength of 0.3mm and when dealing with light waves, the wavelengths involved are around 600nm (0.0006mm). Through the air communication at frequencies above 100GHz is difficult for radio amateurs using conventional techniques because of the high cost and low availability of suitable components, low transmitter powers and the fact that the atmosphere is becoming opaquer with increasing frequency, primarily because of water vapour and oxygen absorption. Operating at light wave frequencies, however, is considerably easier because of the ready availability of inexpensive high-power red LEDs, photodetectors and high gain antenna systems based on Fresnel lenses; furthermore, the atmosphere is fairly transparent to light waves and hence contacts over distances of several hundred km have already been achieved by a number of radio amateurs.

The next challenge for radio amateurs is that of exploring the frequency range between, say, 1THz and 470THz. Over much of this range, the atmosphere is opaque, but there are "windows" in which the transmission losses are much lower. Of particular interest to radio amateurs is the so-called "Long Wavelength Infrared" (LWIR) band, corresponding to frequencies around 30THz and wavelengths around 0.01mm. In this band, the atmosphere is even more transparent than at light frequencies. This fact has long been appreciated by the military and security agencies but the equipment which they operate is either not available to the experimenter or is extremely expensive. In two recent YouTube videos [1],[2], however, VK3CV has demonstrated that it is possible for radio amateurs to operate at these frequencies by using readily available and inexpensive sensors such as those used in the ubiquitous COVID-19 remote reading infrared thermometer. These sensors are made by several manufacturers but one in particular, the Melexis MLX90614 [3], will be considered here since it is readily available from eBay and is already mounted on a small PCB which also contains the additional components needed for simple interfacing to a microcontroller such as an Arduino. To make life even easier, Adafruit have already developed an Arduino library for the sensor which may be downloaded from their web site [4] or by using the Arduino IDE Library Manager.

Before describing my equipment for use on the 30THz band, it is necessary to give a brief overview of the way in which electromagnetic waves interact with objects at these frequencies. The starting point is the fact that every natural object in the Universe radiates electromagnetic waves because its associated temperature is above absolute zero (0K or -273.15^{o}C). The coldest "object" is left-over radiation from the "Big Bang" and this has a temperature of about 2.7K. The average human body, at about 37^{o}C (310K), radiates electromagnetic waves whose frequency is centred around 32THz (a wavelength of about 9.3 µm). The Sun, which has a surface temperature of roughly 6000K, emits electromagnetic waves over a very wide range of wavelengths, but those lying between about 400nm and 700nm are perceived by our eye-brain combination as the visible colour spectrum ranging from purple to red.

To a first approximation, the way in which real objects radiate electromagnetic energy is described by Planck's Law. This allows us to estimate the strength of the radiated signal from an object at a given temperature, as a function of wavelength. Some typical radiation curves are shown in Figure 1. The wavelength range in the figure was chosen to match that of the MLX90614 sensor.

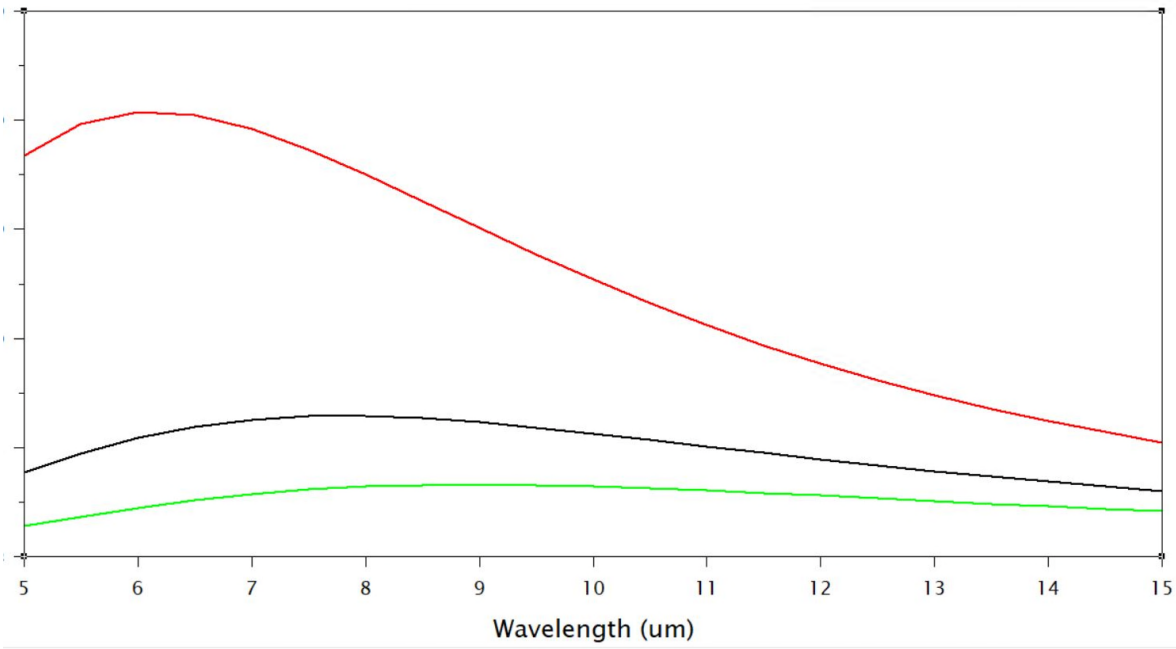


Figure 1 Black-Body radiation characteristics for an object at various temperatures
Vertical axis denotes radiation intensity. Green curve 37 ^{o}C, Black curve 100 ^{o}C, Red curve 200 ^{o}C

The temperatures used in computing the curves shown in Figure 1 are typical of the human body, the boiling point of water and that of a typical domestic steam iron. It can be seen that an object radiates more energy the higher its temperature, the energy is radiated over a wide range of wavelengths (or frequencies) and the position of peak emission changes with object temperature. The relationship between an object's temperature and the wavelength at which maximum radiation of energy occurs is called Wien's Law and this is shown in Figure 2 for part of the detection temperature range covered by the MLX90614 sensor (actual range is -30^{o}C to 380^{o}C which corresponds to a wavelength range of about 14µm to 5.5µm).

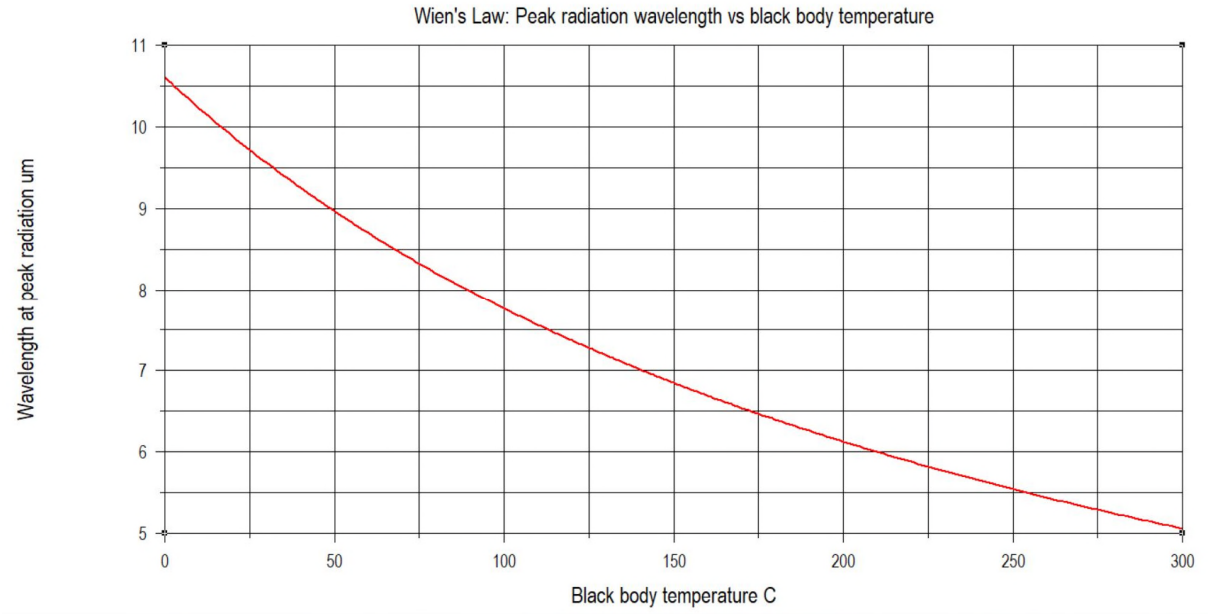


Figure 2 Wien's Law. Peak radiation wavelength vs object temperature

Hence it can be seen from Figure 2, why the Melexis 90614 sensor is suitable for measuring the temperature of the human body (37^{o}C equates to a radiation peak at about 9.3µm).
Strictly speaking, the radiation curves shown in Figure 1 only apply to a fictitious object known as a Black Body. This is an object which is in thermal equilibrium in the sense that it acts both as a perfect absorber and a perfect emitter of energy over the entire frequency spectrum; hence its temperature remains constant. Real objects are often referred to as Grey Bodies since not only do they not absorb all the energy incident upon them (i.e., some may be reflected or

scattered) but the amount of energy emitted does not necessarily equal the amount absorbed; hence their temperature may change with time and circumstances (a night storage heater or a cup of coffee are good examples). Thus, a Black Body is a theoretically perfect entity which is used as a standard against which to compare the properties of real objects and materials. It is analogous to the idea of comparing the gain of a real antenna with that of an isotropic radiator, which also does not exist in practice. By comparing the properties of a Grey Body with those of a Black Body it is possible to determine which materials will be suitable for particular purposes in our 30THz equipment. For example, a curved highly polished metallic surface should act as a good parabolic reflector antenna at 30THz whereas a painted metallic surface would not. Conversely, a heated black anodised aluminium surface (e.g., a transistor heat sink) should act as a reasonable emitter at 30THz and so might make a good choice for a simple test source, as would a human hand with its rough textured skin.

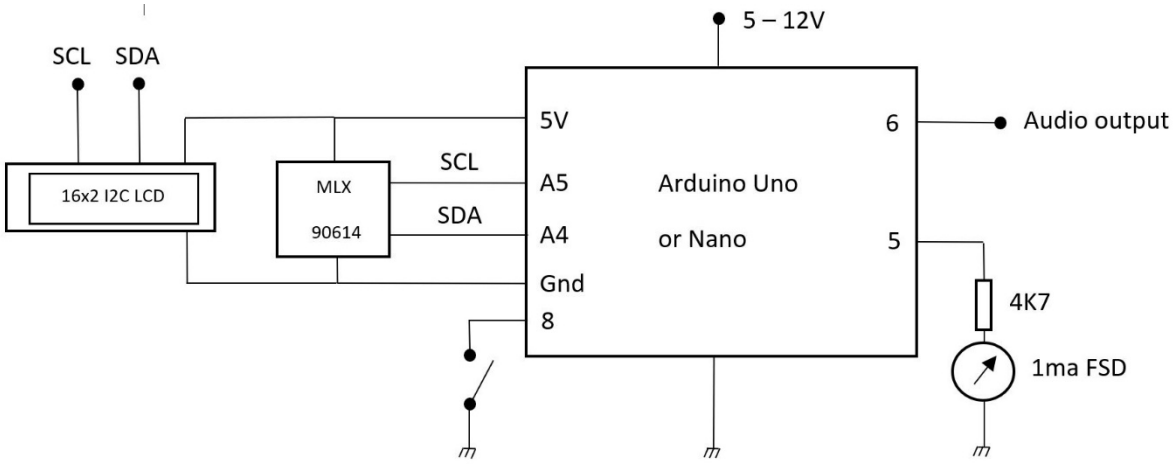


Figure 3 Schematic of 30THz receiver

A simple receiver for 30THz

The circuit schematic of my receiver is shown in Figure 3. At its heart is a Melexis 90614 sensor which is available on eBay for about £10 and is supplied on a small PCB together with the few additional components needed to implement an I2C interface. A close up of this PCB is shown in Figure 4. The sensor data, in the form of two temperature values, the sensor ambient temperature and the object temperature, may be read using an Arduino Uno or Nano and the Adafruit 90614 sensor library. When the measured object temperature is greater than the sensor ambient temperature, the difference is considered to be a measure of the received infrared signal strength. This signal level can be interpreted in several ways; for example, the temperature difference can be displayed as a number in ^{o}C, as a meter deflection or converted into an audio tone whose pitch increases with increasing signal level. By these means, the sensor when mounted at the focus of a parabolic dish, can be pointed accurately in the direction of the infrared transmitter. Once the receiving antenna has been aligned for maximum received signal, the receiver can be switched from the “dish align” mode to the “demodulate” mode; in this case it merely provides an audio output, at a user-chosen constant frequency, but only when the measured apparent temperature of the distant heat source (i.e., the transmitter) is greater than the sensor ambient temperature. Hence, if the transmitter is then modulated by switching it on and off in the appropriate way, the result at the receiver will be an audio tone which sounds like normal CW. In practice, because of the slow response of the sensor, QRSS rather than normal speed CW may have to be transmitted. My receiver uses a 25cm 0.46 f/D parabolic reflector antenna with the Melexis sensor mounted at its focus, as shown in Figure 5. The reflector had originally been a searchlight mirror and is made of cast aluminium whose surface has been silver plated. A perfectly acceptable alternative would be to use a normal aluminium prime focus dish which has had any paint layer removed and the metal surface polished using a propriety chrome cleaner, such as Autosol™; this is widely available from hardware and motor accessory shops. The Melexis sensor has a 90^{o} field of view and so the ideal dish f/D would be 0.5 but this is not critical. It is possible to obtain other reflectors such as concave shaving mirrors, but these are not suitable because the reflecting surface is at the back of the glass and the latter is not transparent at 30THz. Similarly, common glass lenses are not viable at 30THz, but others using certain plastics such as polyethylene or unusual materials such as germanium are available but the latter material is expensive and toxic.
My receiver is mounted on a wooden baseboard and comprises a collection of whatever suitable components I had to hand. The layout is not at all critical, as can be seen from Figure 6. The audio tone output is taken from Arduino pin 6 (and Gnd) and can be fed either to a small audio amplifier and speaker or just to a speaker via a 470R pot configured

as a variable resistor. A SPST toggle switch is connected between Arduino pin 8 and Gnd. When the switch is open, the receiver is in “dish align” mode and in “demodulate” mode when it is closed. A signal strength meter is driven by the voltage output at Arduino pin 5. The output range is nominally between 0 and 5V, the latter value indicating a very strong received signal (i.e., a very high measured source temperature). I had to hand a 0 – 1ma FSD meter, so this required an additional series resistance of 4K7 ohms. Meters with other FSD values can be accommodated by an appropriate choice of series resistance but the current drawn from Arduino pin5 should be limited to no more than about 10ma. If actual values of the measured source and sensor ambient temperatures are required, these can be displayed using an optional 16 x 2 I2C LCD display which is updated once every second when the receiver is in the “dish align” mode.
The Arduino sketch which controls the receiver is available by contacting me via e-mail [5].

Receiver testing

The receiver can be tested for correct operation merely by switching to the “dish align” mode and placing a warm object (even a finger) close to the sensor when an audio tone should be heard. The hotter the object is, the higher the audio tone pitch should be. Other convenient test sources are a domestic hot water radiator or a kettle containing recently boiled water. The latter source has been used to try and assess the receiver sensitivity. In a typical test down my garden, I chose a time when the ambient temperature was 1^{o}C, the ground was frost covered and there was no wind. The receiver was left outside for 10 minutes to enable the MLX90614 sensor to cool down and the dish was aimed at a vertical fence panel made of slatted bamboo which was assumed to be at the ambient temperature. The surface temperature of the kettle, which was made of shiny black plastic, was measured as 75^{o}C. The test consisted of walking down the garden with the kettle in hand and trying to keep the kettle within the dish beam, using the audio output from the receiver speaker as a guide. This became quite difficult to achieve as the distance between the kettle and the dish increased since when reaching the fence at a distance of 20m, the beamwidth was only about 10cm wide in both azimuth and elevation. This test was carried out with the receiver in the “demodulate” mode. In this case an 800Hz tone could be heard whenever the measured source temperature was greater than the sensor ambient temperature, so the detection process is binary in the sense that an 800Hz tone is either heard or it isn’t. This feature should be advantageous when receiving weak signals. Thus, at a kettle distance of 20m from the receiver dish, the 800Hz tone was as loud as it had been at, say, 1m. The conclusion from this test was that the kettle should have been detectable at a distance greater than 20m but the additional margin could not be estimated at the time, during a period of COVID-19 “lockdown”, because of no access to a larger test area and the fact that the receiver was not then fitted with a temperature display.
In a later article, I will discuss further testing of the receiver and the construction of practical modulated infrared transmitters which are suitable for “in-field” use.

References

1. VK3CV 30THz Equipment test #4 - YouTube
2. VK3CV 30THz full system demonstration. - YouTube
3. Datasheet for MLX90614 - Free Download #Melexis
4. Adafruit MLX90614 Library - Arduino Reference
5. b.chambers@sheffield.ac.uk

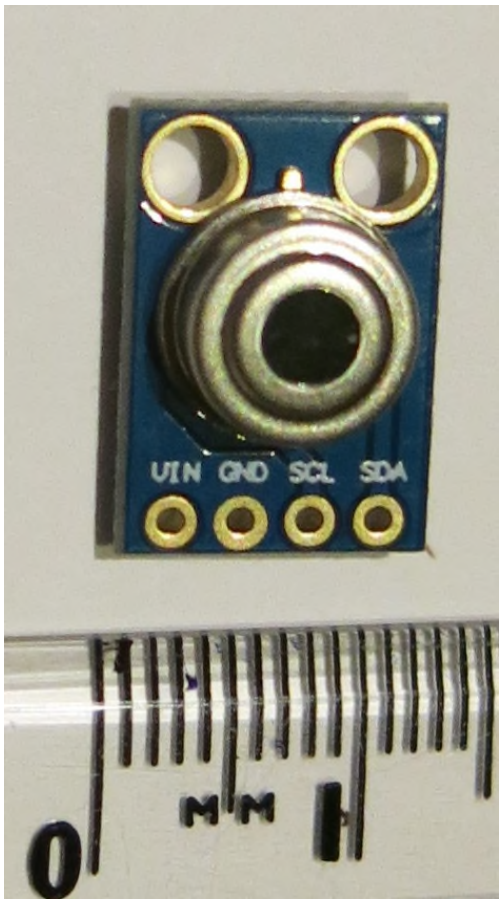


Figure 4 Melexis 90614 sensor

Figure 5 Melexis sensor mounted at the focus of the parabolic reflector

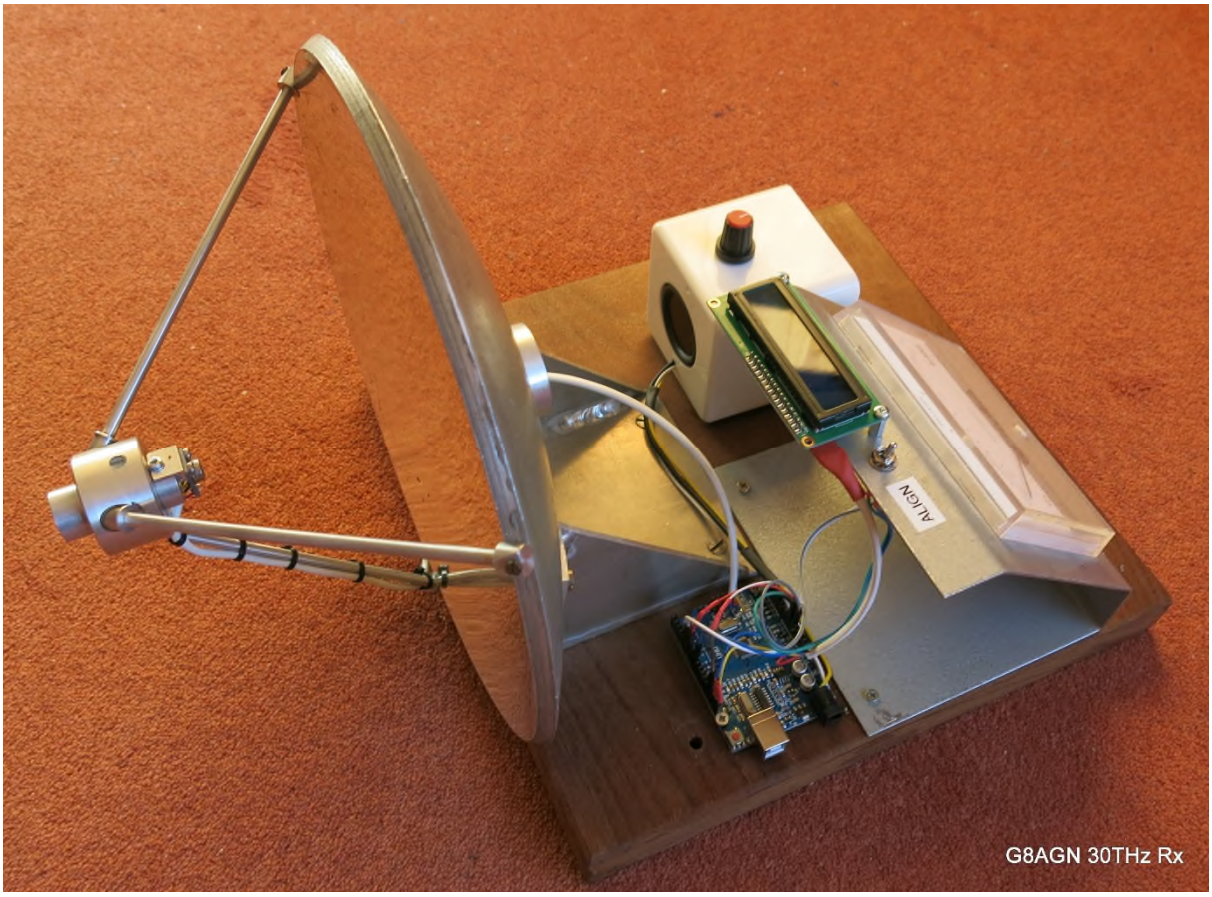


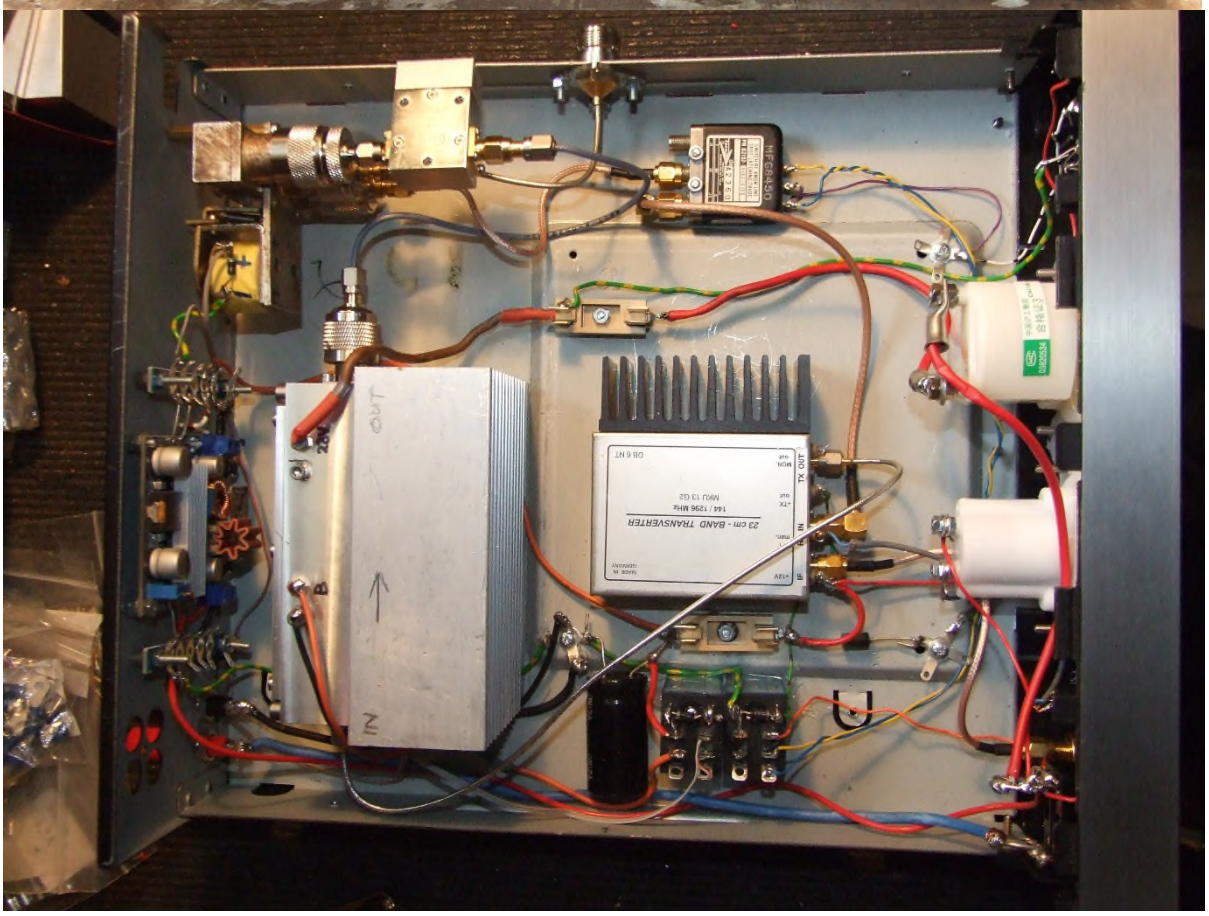
Figure 6 General view of the 30THz receiver

Barry has started a new Groups.io for those interested in 30THz Amateur-30THz@groups.io.

This month I have been…..

From Ben G4BXD

Luckily, even during lockdowns the mail has got through. This has enabled me to source and assemble my new 23Cm setup.
This comprises a Kuhner transverter and a PE1RKI pa. I had a large relay for the antenna switch but worried that the isolation might not be enough I added a second SMA relay inline with the receive path. Finally managed to find a suitable box, added some meters to make it look nice and I am about to test the finished unit



From Clive Elliott GW4MBS (ex-G8ADP)

The report I sent in last year included a picture of my 10 GHz portable set up on my Land Rover operating on a hill a few km from home at the top of our valley. At home down in the valley there is no mobile phone signal and no signals to be heard on 10 GHz other than the harmonic from the receiver LO of a Baofeng 70cm handheld.

My shack is in a Dutch barn that also houses the trusty Land Rover. I have now installed a 9m pump-up Hilomast that supports a 1m dish and a 3.5W rig. Whether the mast is extended or not makes little difference as I am firing into the hillside facing South East. Our upper most field is 110m away yet the Baofeng can still be heard although one degree can make all the difference.

I have located a fence post that is exactly in line for the path to Taunton for GB3KBQ and G4UVZ. In the absence of any beacons that can normally be heard here, it is very reassuring to have this reference post that I periodically activate to reassure myself that the rig is working still and that the dish has not been forced off heading by the wind.

It looked like I was going to be dependent on rain scatter as my only link to the world on 10 GHz. Over 40 years ago I learnt that heavy rain overhead was a very useful form of propagation.

WIRELESS WORLD MARCH 1981

WORLD O

Using rain on 10 GHz

The scattering effect of rain on microwave signals has, for a number of years, been recognised as a potential cause of co-channel interference to s.h.f. communication systems, including satellite communications. In 1978, J. A. Lane of the Appleton Laboratory (*Electronics Letters*, Vol 14, No 14, pp.425-427) showed that although in general tropospheric and precipitation scattering are of less consequence for over-the-horizon s.h.f. propagation than super-refraction and ducting, this is not true over very rough terrain or where there is local screening by hills.

On the 10GHz amateur band, Clive Elliott, G8ADP who lives in a heavily screened location at Alresford, Hampshire, can work regularly over paths of up to 150km by means of tropo scatter and is convinced that signals are quite often enhanced by rain scatter. Over a particularly difficult 40km path to G3JVL located at sea level near Portsmouth, effective contacts are largely dependent on rain scatter, with signals maximum when there is heavy rain virtually overhead ("drizzle" is not sufficient) and in such circumstances signals from G3JVL can often be received regardless of which direction G8ADP's aerial is pointing.

He feels that this form of over-the-horizon 10GHz propagation is still seldom recognised or used by amateurs, since much of the effort tends to be concentrated on portable operation in conditions where heavy rain is not welcome. Under normal conditions (if the absence of rain can be termed normal) the signals from G3JVL are about −6dBn (in 2.5kHz bandwidth) but in heavy rain may rise to 30dBn, or about 5 to 15 dBn with the aerial pointing in other directions, including straight up into the sky.

But I was disappointed that despite heavy rain overhead here I was hearing nothing. I concluded that in the present location by that time it was probably too late to be of benefit. By daily searching for beacons, it became evident that approaching rain over the Brecon Beacons was my salvation. When this happens, I can hear GB3KBQ, GB3SCX, the personal beacon of GW4NOS, once even GB3LEX and can regularly work G4UVZ at good strength on SSB, FM & CW.

I am assembling a 12W rig for home use. What I am using at the moment is my portable rig which will soon assume its home in the Land Rover. Then I can operate portable (but not /P) from the designated post in the top field. This field is unfortunately not at the top of the hill but just at the top of my property. But I suspect in the present crisis going up to my hilltop will not be feasible for some time to come. The earlier portable set up was a Sky dish on a Clark PU-8 push up mast. This was not very strong and was devoid of bearing calibration. To improve on this, I have nearly completed the installation of a 6m Hilomast which has lockable sections and will be far more rigid incorporating a calibrated base. To allow for use on uneven or sloping ground the 65cm dish will incorporate a tilt ram with digital readout.

A further improvement has been to abandon the FT-817 as the I.F. and use an IC-705 which was bought to use exclusively for this purpose. I like the waterfall, the memories, and the recorder in particular. Despite the compactness of the rig, it is quite heavy, and I was fearful of damaging it in the rough and tumble of life in the back of a Land Rover. So, I built a frame from bits that I had in the scrap box, this gives fairly good all-round protection with a hinge on the lower front edge to tilt the rig if needed.

Forth UKuG online Lecture

The next on-line talk will be at 20:00UTC on Wednesday 10th February 2021.

Kent Britain WA5VJB will put his amusing slant on antennas, with **Care and Feeding of Yagi's**

The presentation covers 'Some interesting ways to doing Yagi's and myths of Yagi Stacking'

The talk will be streamed on this URL: **batc.org.uk/live/ukmicrowave**

From December's Scatterpoint
Anyone know the path loss for 2.5 billion light years?

The answer from Andy G4JNT

Free Space Path loss at 1.42GHz for 2.5 Billion LY =
32.4 + 20.LOG(1.42 * 2.5E9 * 365.2422 * 86400) = 373dB
(GHz, Lyears, Days/year, seconds/day)

Editors Comments

Thanks to Barry G8AGN for his 30THz article, and all the contributions about what you have been doing during the last month.
Several of you are putting 3.4GHz systems together, so some info on your setups would be good for the next issue.
I doubt portable operation will be allowed for the first UKuG Low band contest in March, but by the second…. Just possibly.

Scatterpoint activity report

Activity News: January 2021

By John G4BAO

Please send your activity news to: **scatterpoint@microwavers.org**

From John G4BAO

Here on the Fen Edge, it's been another quiet month activity wise. The 23cm FM voice repeater GB3PS at Barkway in Herts IO92XA is back on the air after a long absence. Output 1297.075MHz Input 1291.075, 25W EIRP vertical polarisation, access by 77Hz CTCSS tone. It runs a continuous beacon mode, so reports please to beaconspot.uk. The omnidirectional antenna is some 30m AGL and the site 143m AGL, so it is a huge signal over the Fens and beyond. For GB3PS I use a TS2000X running 5 Watts to a vertical PCB log periodic in the loft. The signal is fully quieting at a line-of-sight range of just 33km

I've been continuing work on my 24GHz EME system and planning some rearrangement of antennas in the Spring to put all the GHz bands ones on the same mast

I also got a "HackRFOne Portapack" HF-6GHz SDR transceiver to play with. More about that in March GHz Bands and here.

From Colin G4ERO

Just up the road from me in JO02DJ, Colin, G4ERO is QRV on 23cm with an Elecraft K3 with the internal XV144 transverter driving a SG-Lab 23cm transverter. This feeds a 160W SSPA from DF1SR and a 37el Yagi from www.anjo-antennen.eu type YA130037E. He is also in the final stages of getting QRV on QO-100. Colin also plans to get QRV on 13cms terrestrial with the same transverter.

From Brian G1IKV

I am returning back to 10GHz after a 7-year break, with all new gear. I read G4BAO's article in the Radcom Jan 2021 GHz Bands, where described a Diode on the end of coaxial cable as a 10Ghz signal source. As this was just what I was looking for, I got an ADF4351 PPL RF signal source to use to test the new gear on RX. I tried it with new 10G setup and it works a treat.

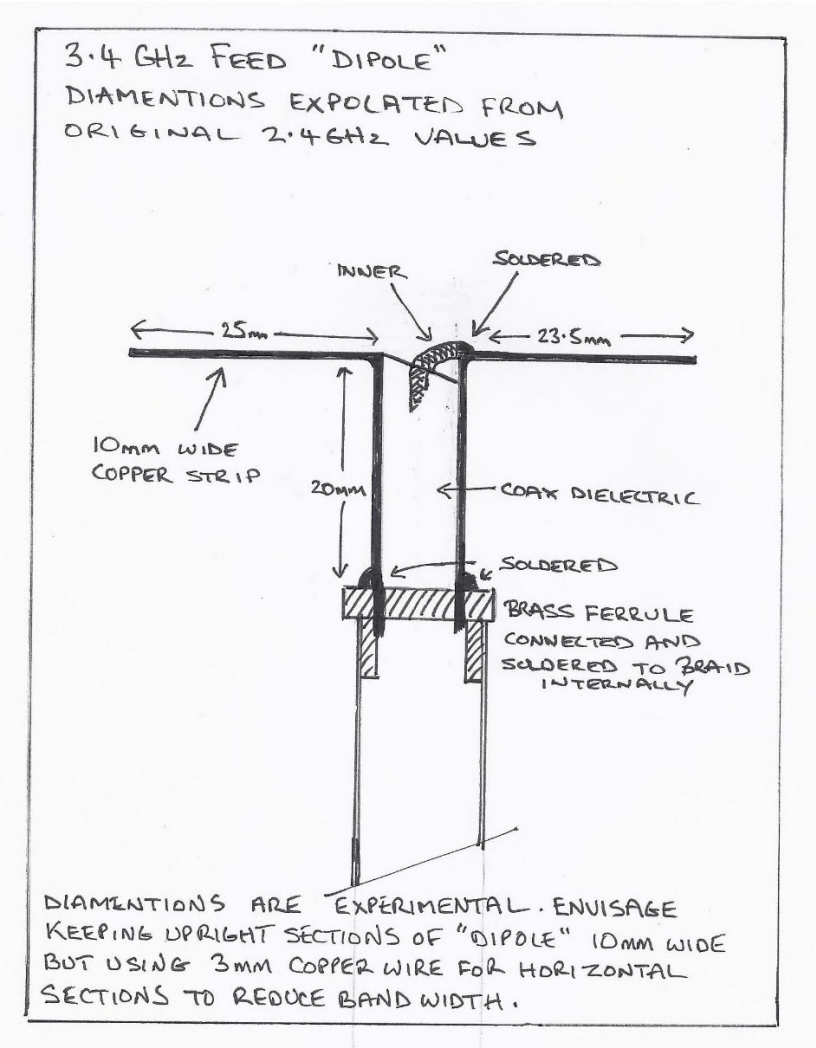
From Graham G3TCT

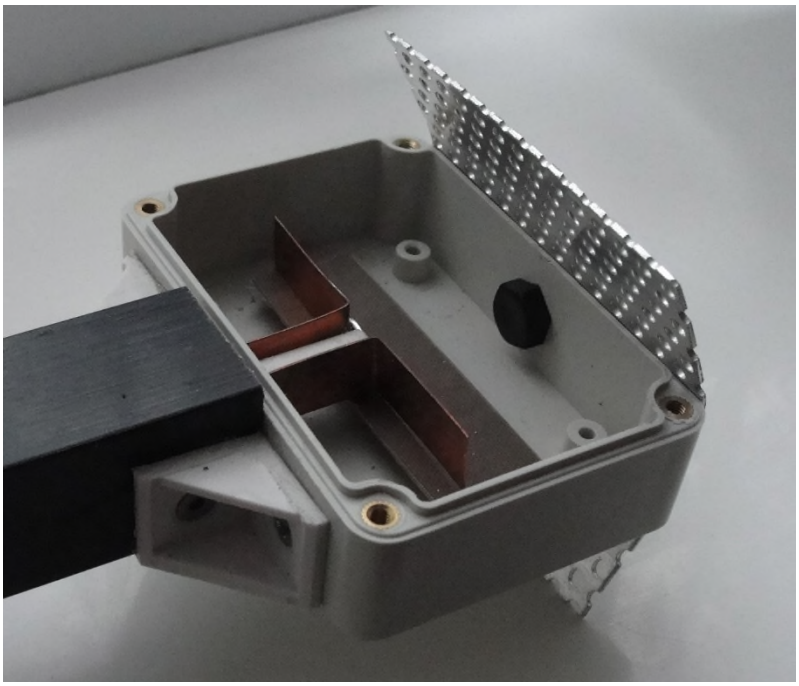
This might amuse some - Extreme frost on 1 Jan 2021 on my 23cm antenna, also seen on a guy rope. Signals on 23cm were 20dB down on usual, but recovered once the sun came up within 10 minutes. I didn't try putting any RF into it whilst it was frosted in case the VSWR was poor, and I don't think 100W would have had much effect.

From Colin G8LBS

Here are some details of a feed for a TP-Link dish to use it on 3.4GHz originally bought in Ireland. There are several private companies selling them at inflated prices, however I found this company 30dBi 5GHz Parabolic Grid Antenna Band C N-Type | wifi-antennas.co.uk (wifi-antennas.co.uk) but beware, some of the 5GHz versions are a smaller size grid dish. Mine measures 100cm x 60cm (or 120cm x 65cm if you measure both the concaves) Image 3 is library pic of the original (in vertical polarity mode). I have not done anything extensive due to the cold outside but I quickly put the dish and feed on a tripod outside with the SG-lab transverter at the very back of the dish and used the built in directional coupler with two meters to monitor forward and reflected as I moved the feed support in and out and

made slight adjustments to the dipole/corner reflector spacing. I got a very minimal reflected reading in the end with a 'green' LED on the transverter. I realise this is not very scientific but its 'ballpark' and until I can get it checked on a proper VNA it will do for now. I have no idea how its illuminating the dish but looking at Martlesham the beacon is very strong and the pointing is sharp. As is the local watertower and humungous amounts of hash. As it is I think I will still need an in band filter. First image are dimensions and second completed feed with reflector. Black support is 25 x 25mm GRP section that slides in and out of dish vertex





From Ross G6GVI

I read G4BAO's plea for reports of non-contest SHF activity in RadCom "GHz Bands" column, so the following should be welcome news.

Let me reassure you that the 23cm band is still thriving in the North-West: over the course of 2020, I logged more than 650 QSOs on 23cm, of which only 206 were during the contests *(and so far this month the ratio has been 11 contest contacts out of 57 overall)*. You may be surprised that the vast majority of my 23cm activity is on FM (around 1297.500) and includes a regular net which we hold on Wednesday evenings *(from around 8:15 to 10pm)*. Sometimes we've had as many as eight call into this net and have heard a total of 26 different stations at some point during the course of last year! But this net can be quite a challenge, as most of us use horizontal beam antennas and need to find a "compromise" set of beam-headings where we can all hear one another - making extensive use of side-lobes and

reflections! Normally we can manage an "all-heard" net, but last Wednesday we were struggling with signals much weaker than normal during the snow-storm - perhaps due to all our aerials icing up?
All of this is even more surprising given that my QTH is not well-sited *(in the bottom of the River Croal valley)*: I have a ridge of higher ground to the S & W, Winter Hill to the NW and the Pennines to the E & N. But I've found in practice that most of the signals which I can hear do peak up on a southerly heading - perhaps scattered from large buildings on the ridge? Certainly when I do occasionally manage contacts to the NW, I need to be beaming around South to get them strongest!
I've posted more information about our 23cm net on my web-page: https://qsl.net/g6gvi/23cm.html
I've also been taking my little Alinco handie up onto the moors (outside of the "lockdown" periods) and last year had sixty contacts on 23cm FM, using just 1W into its set-top antenna - and all but four of these were simplex (the others being via the GB3SE repeater). Recently I've found regular 23cm SSB activity (around 1296.200) on Sunday afternoons and have made contact with seven different stations so far this year.

Contests

UKuG MICROWAVE CONTEST CALENDAR 2021

Dates, 2021	Time UTC	Contest name	Certificates
7-Mar	1000 - 1600	1st Low band 1.3/2.3/3.4GHz	F, P,L
11-Apr	1000 - 1600	2nd Low band 1.3/2.3/3.4GHz	F, P,L
2-May	0800 - 1400	3rd Low band 1.3/2.3/3.4GHz	F, P,L
16-May	0900 – 1700	1st 24GHz Contest	
16-May	0900 – 1700	1st 47GHz Contest	
16-May	0900 – 1700	1st 76GHz Contest	
30-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
30-May	0600 - 1800	1st 10GHz Contest	F, P,L
6-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
20-Jun	0900 - 1700	122-248 GHz	
27-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
27-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
11-Jul	0900 – 1700	2nd 24GHz Contest	
11-Jul	0900 – 1700	2nd 47GHz Contest	
11-Jul	0900 – 1700	2nd 76GHz Contest	
25 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
25 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
29-Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
29-Aug	0600 - 1800	4th 10GHz Contest	F, P,L
12-Sep	0900 - 1700	3rd 24GHz Contest & 24GHz Trophy	
12-Sep	0900 - 1700	3rd 47GHz Contest	
12-Sep	0900 – 1700	3rd 76GHz Contest	
26 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
26 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
10-Oct	0900 - 1700	122-248 GHz	
17 -Oct	0900 - 1700	4th 24GHz Contest	
17 -Oct	0900 - 1700	4th 47GHz Contest	
17 -Oct	0900 – 1700	4th 76GHz Contest	
15 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz	F, P,L
Key:	F	Fixed / home station	
	P	Portable	
	L	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)	

2021 Contest Calendar

Month	Contest name	Certificates	Date 2021	Time GMT	Notes
Jan	1.3GHz Activity Contest	*Arranged by RSGB*	19-Jan	2000 - 2230	RSGB Contest
Jan	REF/DUBUS EME 2.3GHz	*Arranged by REF/DUBUS*	23 to 24-Jan	0000 - 2400	REF/DUBUS EME 2.3GHz
Jan	2.3GHz+ Activity Contest	*Arranged by RSGB*	26-Jan	1930 - 2230	RSGB Contest
Feb	1.3GHz Activity Contest	*Arranged by RSGB*	16-Feb	2000 - 2230	RSGB Contest
Feb	2.3GHz+ Activity Contest	*Arranged by RSGB*	23-Feb	1930 - 2230	RSGB Contest
Mar	Low band 1.3/2.3/3.4GHz	F, P,L	7-Mar	1000 - 1600	First 4 hours coincide with IARU
Mar	1.3GHz Activity Contest	*Arranged by RSGB*	16-Mar	2000 - 2230	RSGB Contest
Mar	REF/DUBUS EME 3.4GHz	*Arranged by REF/DUBUS*	20 to 21-Mar	0000 - 2400	REF/DUBUS EME 3.4GHz
Mar	2.3GHz+ Activity Contest	*Arranged by RSGB*	23-Mar	1930 - 2230	RSGB Contest
Apr	Low band 1.3/2.3/3.4GHz 2	F, P,L	11-Apr	1000 - 1600	
Apr	REF/DUBUS EME 10GHz & Up	*Arranged by REF/DUBUS*	17 to 18-Apr	0000 - 2400	REF/DUBUS EME 10GHz & up
Apr	1.3GHz Activity Contest	*Arranged by RSGB*	20-Apr	1900 - 2130	RSGB Contest
Apr	2.3GHz+ Activity Contest	*Arranged by RSGB*	21-Apr	1830 - 2130	RSGB Contest
May	*432MHz & up*	*Arranged by RSGB*	*1 to 2-May*	*1400 - 1400*	RSGB Contest
May	*10GHz Trophy*	*Arranged by RSGB*	*2-May*	*0800 - 1400*	Sunday, to coincide with IARU
May	REF/DUBUS EME 1.2GHz	*Arranged by REF/DUBUS*	15 to 16-May	0000 - 2400	REF/DUBUS EME 1.2GHz
May	24GHz/47GHz/76GHz		16-May	0900-1700	
May	1.3GHz Activity Contest	*Arranged by RSGB*	18-May	1900 - 2130	RSGB Contest
May	2.3GHz+ Activity Contest	*Arranged by RSGB*	25-May	1830 - 2130	RSGB Contest
May	5.7GHz/10GHz	F, P,L	30-May	0600-1800	
Jun	Low band 1.3/2.3/3.4GHz 4	F, P,L	6-Jun	1000 - 1600	Aligned with some Eu events
Jun	REF/DUBUS EME 5.7GHz	*Arranged by REF/DUBUS*	12 to 13-Jun	0000 - 2400	REF/DUBUS EME 5.7GHz

Jun	1.3GHz Activity Contest	*Arranged by RSGB*	15-Jun	1900 - 2130	RSGB Contest
Jun	122-248GHz		20-Jun	0900-1700	
Jun	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Jun	1830 - 2130	RSGB Contest
Jun	5.7GHz/10GHz	F, P,L	27-Jun	0600-1800	
Jul	VHF NFD (1.3GHz)	*Arranged by RSGB*	3-Jul to 4-Jul	1400 - 1400	RSGB Contest
Jul	24GHz/47GHz/76GHz		11-Jul	0900-1700	
Jul	1.3GHz Activity Contest	*Arranged by RSGB*	20-Jul	1900 - 2130	RSGB Contest
Jul	5.7GHz/10GHz	F, P,L	25-Jul	0600-1800	
Jul	2.3GHz+ Activity Contest	*Arranged by RSGB*	27-Jul	1830 - 2130	RSGB Contest
Aug	1.3GHz Activity Contest	*Arranged by RSGB*	17-Aug	1900 - 2130	RSGB Contest
Aug	2.3GHz+ Activity Contest	*Arranged by RSGB*	24-Aug	1830 - 2130	RSGB Contest
Aug	5.7GHz/10GHz	F, P,L	29-Aug	0600-1800	
Sep	24GHz/47GHz/76GHz		12-Sep	0900-1700	
Sep	1.3GHz Activity Contest	*Arranged by RSGB*	21-Sep	1900 - 2130	RSGB Contest
Sep	5.7GHz/10GHz	F, P,L	26-Sep	0600-1800	
Sep	2.3GHz+ Activity Contest	*Arranged by RSGB*	28-Sep	1830 - 2130	RSGB Contest
Oct	*1.3 & 2.3GHz Trophies*	*Arranged by RSGB*	*3-Oct*	*1400 - 2200*	RSGB Contest
Oct	*432MHz & up*	*Arranged by RSGB*	*3 to 4-Oct*	*1400 - 1400*	IARU/RSGB Contest
Oct	122-248GHz		10-Oct	0900-1700	
Oct	24GHz/47GHz/76GHz		17-Oct	0900-1700	
Oct	1.3GHz Activity Contest	*Arranged by RSGB*	19-Oct	1900 - 2130	RSGB Contest
Oct	ARRL Microwave EME	*Arranged by ARRL*	23 to 24-Oct	0000 - 2359	ARRL EME 2.3GHz & Up
Oct	2.3GHz+ Activity Contest	*Arranged by RSGB*	26-Oct	1830 - 2130	RSGB Contest
Nov	Low band 1.3/2.3/3.4GHz 5	F, P,L	14-Nov	1000 - 1400	
Nov	1.3GHz Activity Contest	*Arranged by RSGB*	16-Nov	2000 - 2230	RSGB Contest
Nov	ARRL EME 50-1296MHz	*Arranged by ARRL*	20 to 21-Nov	0000 - 2359	ARRL EME Contest
Nov	2.3GHz+ Activity Contest	*Arranged by RSGB*	23-Nov	1930 - 2230	RSGB Contest
Dec	ARRL EME 50-1296MHz	*Arranged by ARRL*	18 to 19-Dec	0000 - 2359	ARRL EME Contest
Dec	1.3GHz Activity Contest	*Arranged by RSGB*	21-Dec	2000 - 2230	RSGB Contest

EVENTS 2021

Events may be subject to cancellation due to the Coronavirus
For latest information consult https://microwavers.org

2021

February 20	Tagung Dorsten - cancelled -virtual tbc	www.ghz-tagung.de/
April 24	CJ-2021, Seigy - cancelled	www.cj.r-e-f.org/
April 24	RSGB AGM - virtual	www.rsgb/agm
May 21-23	Hamvention, Dayton - cancelled	www.hamvention.org
June 25-27	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de
August 19-22	EME 2021, Prague – rescheduled from 2020	www.eme2020.cz
September 24-25	National Hamfest	www.nationalhamfest.org.uk
October 10-15	European Microwave Week, London, Excel	www.eumweek.com/

80m UK Microwavers net

Tuesdays 08:30 local on 3626 kHz (+/- QRM)

73 Martyn Vincent G3UKV