On Fri, Nov 2, 2018 at 6:01 AM Rüdiger Möller <rue.moeller@t-online.de> wrote:
Hi Brian,
I've thought about your intensions to use fully-saturated PA transistors with a diplexer that shunts the harmonic power for dissipation in a resistor.
I'm very interested to have a look of your circuit diagrams. Meantime I have left the path of using Si-Carbide mosfets in EF2,odd amplifier stages, because two sets of mosfets are burned. The reason for that is unknown. In any case the glimmer insulating was destroyed. So I have decided to use for further tests GAN fets from Infineon (see attachment) with bottom cooling heatslug, also they have the source pin on the heatslug and not the drain pin. I will buy this kind of mosfets from Digi-Key. With this kind of mosfets the insolating problem don't further exist, hopefully.
73
Rüdiger
DJ1MR

Von: Brian Machesney [mailto:nekvtster@gmail.com]
Gesendet: Samstag, 27. Oktober 2018 14:35
An: rue.moeller@t-online.de
Cc: Phil Harman <phil@pharman.org>
Betreff: Re: "Thor" revival

Many thanks, Rudiger.

I will be busy with CQ WW SSB contest this weekend. I will package up some design files and send them to you next week.

73 -- Brian

p.s. There seems to also be strong interest among the Hermes-Lite crowd.

On Fri, Oct 26, 2018 at 6:06 PM Rüdiger Möller <rue.moeller@t-online.de> wrote:
Hi Brian,

I would like to share my experiences in ET, EER, HEER power amplifieres, and PWM techniques with you, if you want it. Also I would support you to get very quickly familiar with the SDR technology. Working together on this project brings a lot of fun.
Your question.
Would you be willing to share the details of the interface between Hermes and your PA?
Answer: Yes Of course. So, in the attachments I send you some details of the interface between Hermes and my PWM, PA. Also I give you some hints oft the EER menu in the Power SDR software. If you have any questions please feel free to ask me.

Brian wrote:
Of course, I will be happy to share with you all of my designs, if there is anything you would like to see
So I would like to see your circuit diagram of the GAN Fet power amplifier and the output filters.

GAN FETs: I totally agree.

Best regards
Ruediger
DJ1MR

Von: Brian Machesney [mailto:nekvtster@gmail.com]
Gesendet: Freitag, 26. Oktober 2018 20:26
An: rue.moeller@t-online.de
Cc: Phil Harman <phil@pharman.org>; warren@pratt.one
Betreff: Re: "Thor" revival

Thanks for taking the time to write, Rudiger. I watched all of the YouTube videos of the 2018 SDR Academy. Very impressive work, gentlemen.

After working with K1KP on Class E as well as voltage-mode and current-mode Class D, I have decided to take a different direction. Because Class E is notoriously difficult to band-switch and Class D doesn't tolerate much deviation from perfect harmonic reflection, I follow the fully-saturated PA transistors with a diplexer that shunts the harmonic power for dissipation in a resistor. This yields drain efficiencies of over 80% and, because the FETs always "see" a constant load, it should be easy to reproduce while still meeting my cost reduction goal (less excess power supply, heat sinks and fans, etc.).

We used push-pull GaN Systems GS65004B in CMCD configuration to produce 500W output from 160 - 10 meters. They offer an unrivaled combination of power delivery and low drive capacitance. Their 100V parts only cost about $5 each (compared to $12 for GS66504B), so my current plan is to get as much power as I can from push-pull GS61004B, which will deliver at least 400W. I would use power combining to increase total system power. The GaN FETs should also work well as PWM switches; thinking about a future of production volumes, using larger quantities of a single part number should help to lower total cost.

I am completely new to the world of HPSDR, so it will take me some time to get up to speed. I reached out to you because I am in the final stages of defining my next prototype and I want it to be part of a solid SDR system. It seems that I should be able attach my modulator and PA inputs just as you have attached yours. Of course, I will be happy to share with you all of my designs, if there is anything you would like to see (I use LTSpice for circuit modeling and ExpressPCB for boards). Would you be willing to share the details of the interface between Hermes and your PA?

I am very excited about the prospect of working together on this project.

73 -- Brian K1LI

On Fri, Oct 26, 2018 at 12:34 PM Rüdiger Möller <rue.moeller@t-online.de> wrote:

Hi Guys,

Nice to hear, that Brian is working on class E amplifier.
My working on Envelope Tracking power amplifiers using Hermes transceiver and Power SDR software are finished. All systems are working well. In 2018 I've started with developing class E and EF2,odd power amplifiers using the unmodulated phase signal from the Hermes. The results are different between class E and EF2,odd amplifiers. Main problem using a class E amplifier ist the bandwidth limitation on the lower bands, for example 80 meters without tuning elements in the tank circuit. So I have decided to test the EF2,odd amplifier principle (authors Kee, Aoki, Rutledge, 2001 IEEE MTT/S INTERNATIONAL MICROWAVE SYMPOSIUM). The results are good. In the

attachment you can see my first EF2,odd amplifier prototype with Si-Carbide mosfets. I'm using today Si-Carbide mosfets from CREE . I also will test GAN switching power mosfets from GANsystems and Infineon (see attachments). Furthermode I will test in the ingress circuit of the EF2,odd amplifier digital mosfet drivers. In class E amplifier this kind of drivers are working well. This will be done in the next time.

Hi Phil, hi Warren
after a short time since we met in Friedrichshafen in June 2018 I need now a new Power SDR software and a new Hermes firmware version with activated pure signal feature using the unmodulated phase signal for EER mode. It is very impotent to have this feature for EER EF2,odd switching amplifiers. You remember, that in this mode, the pure signal is not activated today. I know that you are very busy and might be Warren to. So, let me know, if you see a chance to activate the pure signal feature for this mode in the next time. I could quickly test new software versions and could give you a feedback.

73

Ruediger

DJ1MR

Von: Brian Machesney [mailto:nekvtster@gmail.com]
Gesendet: Freitag, 26. Oktober 2018 16:24
An: Phil Harman <phil@pharman.org>
Cc: rue.moeller@t-online.de
Betreff: Re: "Thor" revival

Many thanks for taking the time to write back, Phil. I hope we will have a QSO during CQ WW SSB. I will operate from VE2BWL.

As you advise, I will correspond with Ruediger and we will update you with any useful/important findings.

73 -- Brian

On Fri, Oct 26, 2018 at 6:37 AM Phil Harman <phil@pharman.org> wrote:
HI Brian,

Nice to hear from you. This will be short as I'm about to get on a plane to Qatar and will be away for a week.

Yes, Hermes hardware and PowerSDR fully support EER and ET amplifiers. Hermes provides a PWM output that contains the envelope of the signal being transmitted and the RF out is either the phase of the Tx signal or envelope modulated phase.

You can set the time delay between the envelope and the RF in order to compensate for the delay in the PWM filter. Have a look at the EER/ET settings of PowerSDR for more information.

I suggest you also contact Ruediger, DJ1MR, who I have copied this email to since he has extensive experience with using Hermes and PowerSDR with his EER/ET designs.

More on my return.

73 Phil...VK6PH

From: Brian Machesney
Sent: Thursday, October 25, 2018 8:07 PM
To: Phil Harman
Subject: "Thor" revival

Hello, Phil,

I believe we corresponded on this subject a number of years ago. I have made considerable progress on the hardware side. I know how to put out 500W at 85% efficiency from 160 - 10 meters. While K1KP and I published some early results using class E, I've made considerable changes that result in a unit that should be easy to reproduce.

Before I execute a prototype transceiver, I need to integrate my hardware with an appropriate SDR platform. Given its history, openHPSDR seems like a good choice. How would I get started?

73 -- Brian K1LI

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