20HP, 90% efficiency, pf = 0.9, 480V => 3ph RLA = 46.2A, FLA = 57.8 A

High Power Amplifier

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<http://datasheets.globalspec.com/ds/3599/PowerAmpDesign/46D8D7B0-E935-4AC7-B151-B20AE62D7E04>

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<http://www.sciencedirect.com/science/article/pii/S016890021200215X>

<http://www.irf.com/product-info/datasheets/hirel/oma541sk.pdf>

Helpful links

<https://www.electrical4u.com/induction-motor-braking/>

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<http://literature.rockwellautomation.com/idc/groups/literature/documents/um/s3064-um001_-en-p.pdf>

Scrutinizing a SiC Transistor Gate-Driver IC

<https://www.electronicdesign.com/power/scrutinizing-sic-transistor-gate-driver-ic>

How Wide-Bandgap Devices Add Value in Bidirectional Power Conversion

<https://www.electronicdesign.com/automotive/how-wide-bandgap-devices-add-value-bidirectional-power-conversion>

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Data Sheet

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<http://files.iccmedia.com/pdf/2018_powercon/munich1_1330_unitedsic.pdf>

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<https://www.mouser.com/ProductDetail/UnitedSiC/UJ3C065030K3S?qs=XFmntM7Yc9fNlgmaO4KCdg%3D%3D>

Improving Totem-Pole PFC and On Board Charger performance with next generation components

<https://www.psma.com/sites/default/files/uploads/tech-forums-semiconductor/presentations/is015-improving-totem-pole-pfc-and-board-charger-performance-next-generation-components.pdf>

5 ways to generate a sine wave

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Simple Generator Provides Very-Low-Frequency Distortion Sine and Square Waves

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LT1007/LT1037 Ultrapure 1kHz Sine Wave Generator

<https://www.analog.com/en/design-center/reference-designs/circuit-collections/lt1007-lt1037-ultrapure-1khz-sine-wave-generator.html#cc-overview>

Sine Wave Generator Circuit

<https://www.electroschematics.com/13021/sine-wave-generator-circuit/>

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<https://www.allaboutcircuits.com/technical-articles/basics-of-ssr-solid-state-relay-the-switching-device/>

<https://www.phidgets.com/docs/Solid_State_Relay_Primer>

### Proportional Control SSR

Proportional Control Relays (often simply called "Control Relays") are SSRs you can use to control the amount of power to the load. Rather than reduce the voltage, or somehow limit the current - which would be very expensive solutions, the Proportional SSR reduces power by turning the load on/off quickly, feeding full power in short pulses.

Proportional SSRs are controlled by a variable voltage - as the control voltage increases, more power is available to the load. Our PhidgetAnalog product can be used to control Proportional SSRs, since an [analog output](https://www.phidgets.com/docs/Analog_Output_Primer) can output various amounts of voltage, as opposed to a digital output, which only has two states- high and low. We don't sell Proportional SSRs - but they can be purchased from [Digikey](http://www.digikey.com/), where they are called AC Linear Controlled SSRs.

A quick and dirty solution for dimming with Phidgets is to use an RC Servo Motor with a PhidgetAdvancedServo controller to rotate the knob on a light dimmer. From software, the RC Servo Motor is rotated to the desired position, cranking the knob as it turns. While this may seem like a roundabout way of achieving proportional control, dimmers tend to be much less expensive because they are less specialized and are manufactured in greater quantity.

Supercapacitors

<https://www.murata.com/~/media/webrenewal/products/capacitor/edlc/techguide/electrical/c2m1cxs-053.ashx>

<https://www.eaton.com/content/dam/eaton/products/electronic-components/resources/technical/eaton-supercapacitor-application-guidelines.pdf>

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<https://www.ttiinc.com/content/dam/ttiinc/manufacturers/kemet/pdf/LED_Lighting_and_Supercapacitors.pdf>

<https://www.digikey.com/Site/Global/Layouts/DownloadPdf.ashx?pdfUrl=79E12686AEDF4E499972BEDDEAA151DF>

<https://www.analog.com/media/en/reference-design-documentation/design-notes/dn450f.pdf>

Illinois Capacitor DGH Series Supercapacitors offer massive capacitance, low ESR and very low cost. Line now expanded up to 470F!

<https://www.illinoiscapacitor.com/products/dgh_new_series.aspx?mkt_tok=eyJpIjoiTWpVd01USTRaakl5WkRJMiIsInQiOiJPeUVSUWxtcThBdzN5bUk4S0pZOFRtcVwvNUpqcmJxWDF5OEQ4Y0F0ZGJzRE9tZlJcLzQ3bWZDTE9hMkVKTitzM3l4UUVvZlwvdW5iVkRCYXhyV280VEJRQ2lnVkdNb0pXblpEUnE3WVZwUklDOGo2N2l5WWdVaTNuMG11R1ZHS1crTSJ9>

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MOSFET Amplifiers

<https://www.electronics-tutorials.ws/amplifier/mosfet-amplifier.html>

N-type eMOSFET Characteristics Curves

<https://www.youtube.com/watch?v=H7Gdz4QTvUU>

<https://www.youtube.com/watch?v=WFWuDjQxFcI>

Book chapter on FET Amplifiers

<http://www.mhhe.com/engcs/electrical/neamen01/ch06.pdf>

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A practical approach to designing a MOSFET amplifier paper

<https://www.asee.org/public/conferences/56/papers/11289/download>

Lab 6: MOSFET Amplifier – UT Dallas

<http://www.utdallas.edu/~yxc101000/courses/3111Lab/handouts/Lab%206.pdf>

Circuits 2 A complete MOSFET example AC and DC analysis

<https://www.youtube.com/watch?v=kGgPOmOvg5M>

search

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<https://www.ttiinc.com/content/ttiinc/en.html>

HIGH POWER (35 KW AND 190 KW) 352 MHZ SOLID STATE AMPLIFIERS FOR SYNCHROTRON SOLEIL

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Development of 20 kW amplifier at very high frequency (VHF)

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LDMOS power transistor at Mouser

<https://www.mouser.com/Semiconductors/Discrete-Semiconductors/Transistors/RF-Transistors/RF-MOSFET-Transistors/Newest-Products/_/N-ax1rx?P=1yot97p>

MRFX1K80HR5 for $316 each 1.8kW NXP RF MOSFET Transistors 65V LDMOS Transistor

<https://www.mouser.com/ProductDetail/NXP-Semiconductors/MRFX1K80HR5?qs=BZBei1rCqCBcq3ESZPU7bw%3d%3d>

475-501N44A-00 for $48 each 1.8kW IXYS RF MOSFET Transistors DE-475 44A 500V N Channel MOSFET

<https://www.mouser.com/ProductDetail/IXYS/475-501N44A-00?qs=sGAEpiMZZMv4z0HnGdrLjrfFIepwpW3gA22bmzsvOAUEkAbyAqG44w%3d%3d>

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<https://www.mouser.com/ProductDetail/ON-Semiconductor-Fairchild/FDL100N50F?qs=GBxGW0xXju923CYRyhG5QQ%3d%3d>

Mouser search Product Type=MOSFET, Channel Mode = Enhancement, power GT 1.5kW

<https://www.mouser.com/Semiconductors/Discrete-Semiconductors/Transistors/MOSFET/_/N-ax1sf?P=1yiaumvZ1y95l6eZ1yw7wqmZ1yvy19vZ1yw7vrkZ1y9oj3eZ1yw7tzyZ1yvy2dq&Keyword=Enhancement+MOSFET&FS=True>

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<http://www.instructables.com/id/Audio-Amplifier-Circuit-Using-Mosfet-Transistor/>

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In other words, an enhancement mosfet does not conduct when the gate-source voltage, VGS is less than the threshold voltage, VTH but as the gates forward bias increases, the drain current, ID (also known as drain-source current IDS) will also increase, similar to a bipolar transistor, making the eMOSFET ideal for use in mosfet amplifier circuits.

<https://electronics.stackexchange.com/questions/179084/driving-dc-motor-using-a-single-mosfet-why-does-the-motor-spin-without-applying>

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some helpful links

this one has nice summary of configurations

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