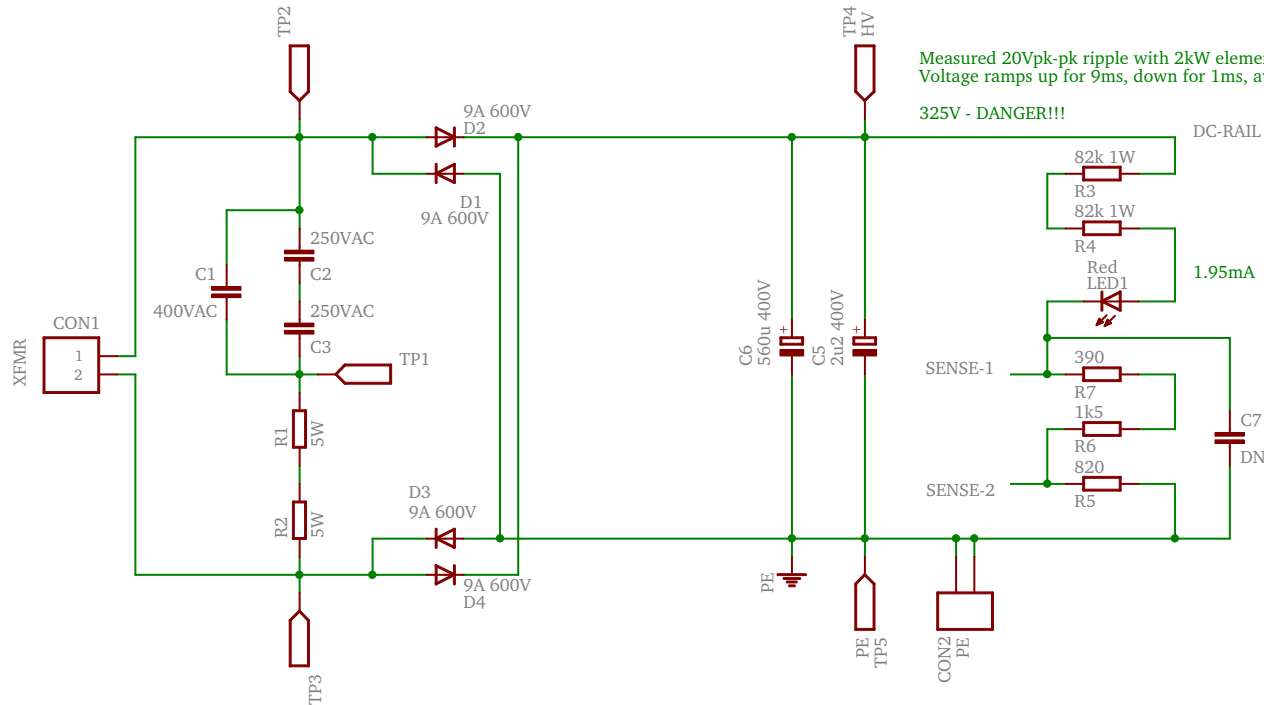


560uF 400V 3.18A ripple 3000 hrs@105C, Rubycon 400HXG560MEFCSN35X45, Digikey #1189-1967-ND, NZ\$16.08
 560uF 400V 3.18A ripple 3000 hrs@105C, Nichicon LGW2G561MELC45, Digikey #493-8558-ND, NZ\$16.09
 9A 600V fast recovery diode, NXP BYV29X-600 TO220F 60ns 1.26V@8A, Digikey #1740-1167-ND
 82k 1W, Yageo FMP100JR-52-82K max 350V, Digikey #82KWCT-ND
 82k 2W (alternative), Digikey #82KZCT-ND
 2.2uF 400V polyester 105C, Panasonic ECQ-E4225KF, Digikey #EF4225-ND
 150p 630VDC high pulse, Kemet PFR5151J630J11L4BULK 100C, Digikey #399-7685-ND
 Fast-On connector tab 6.3mm, TE Connectivity 62409-1, Digikey #A24742-ND
 2-way socket Phoenix 6.35mm pitch MKDS, Phoenix Contact Combicon MKDS 1714955, Digikey #277-1269-ND

For input, influence, or ideas, special thanks to:
 Matt Fox
 Daniel Jury
 Andrew Laphorn
 Bart Wenmeckers
 Ian Williamson



Measured 20Vpk-pk ripple with 2kW element load
 Voltage ramps up for 9ms, down for 1ms, average approx. 310V

325V - DANGER!!!

Sense-1 = 5.0V for 308V rail
 Sense-1 = 5.3V for 325V rail
 Sense-2 = 1.6V for 325V rail
 Sense-2 = 2.0V for 405V rail

Snubber accommodates up to 5W resistors
 Devices in series to meet voltage requirement

A useful addition might be a crowbar system on over voltage of the big cap

Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

560uF good for 400W; scale accordingly
 2.7A RMS ripple for 430W output

Rectification and smoothing

TITLE: inverter-v301

Document Number:

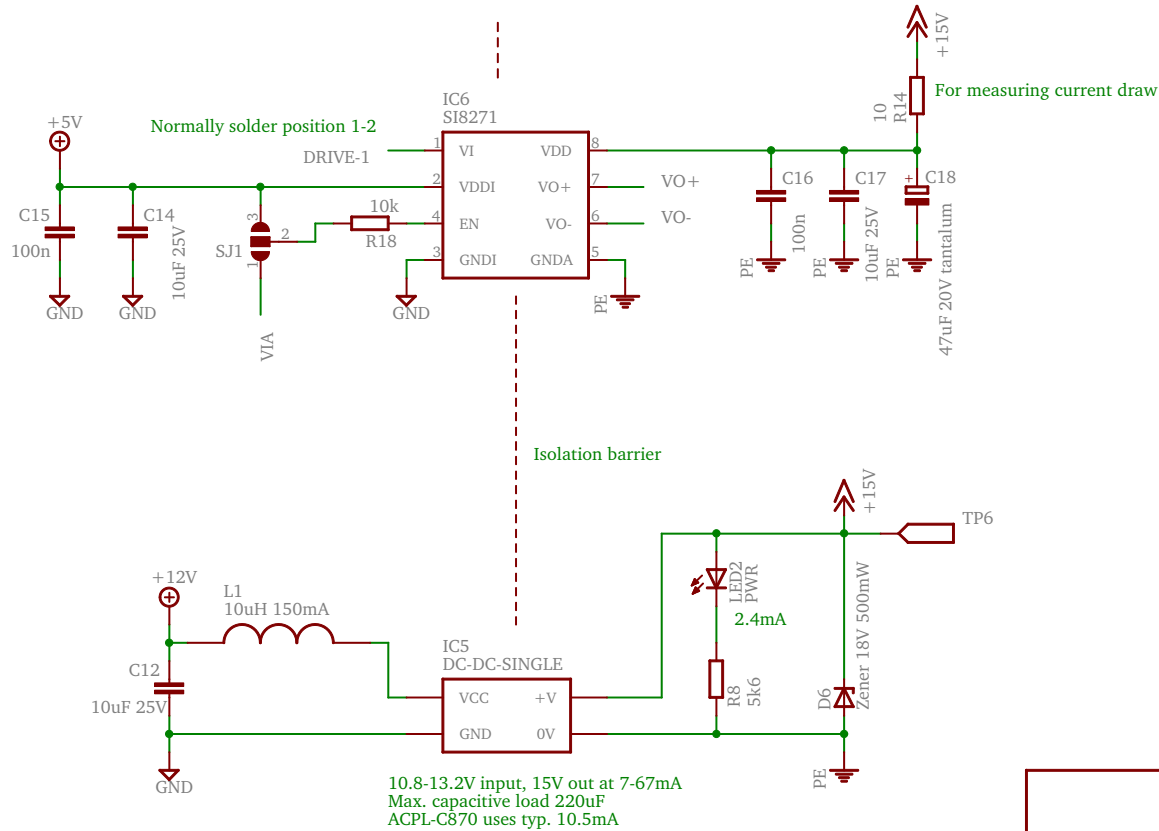
REV:

Date: 11/05/2018 16:18:28

Sheet: 1/7

Isolated driver SI8271, SI8271DB-ISR 4A 2.5kV 12V UVLO SOIC8, Digikey #336-5540-1-ND
 DC-DC converter 12V->15V 1W, CUI PDS1-S12-S15-S 105C 1W, Digikey #102-2739-ND
 47uF 20V tantalum polymer cap, Kemet T521W476M020ATE040 7343 package 40mR ESR, Digikey #399-13120-1-ND

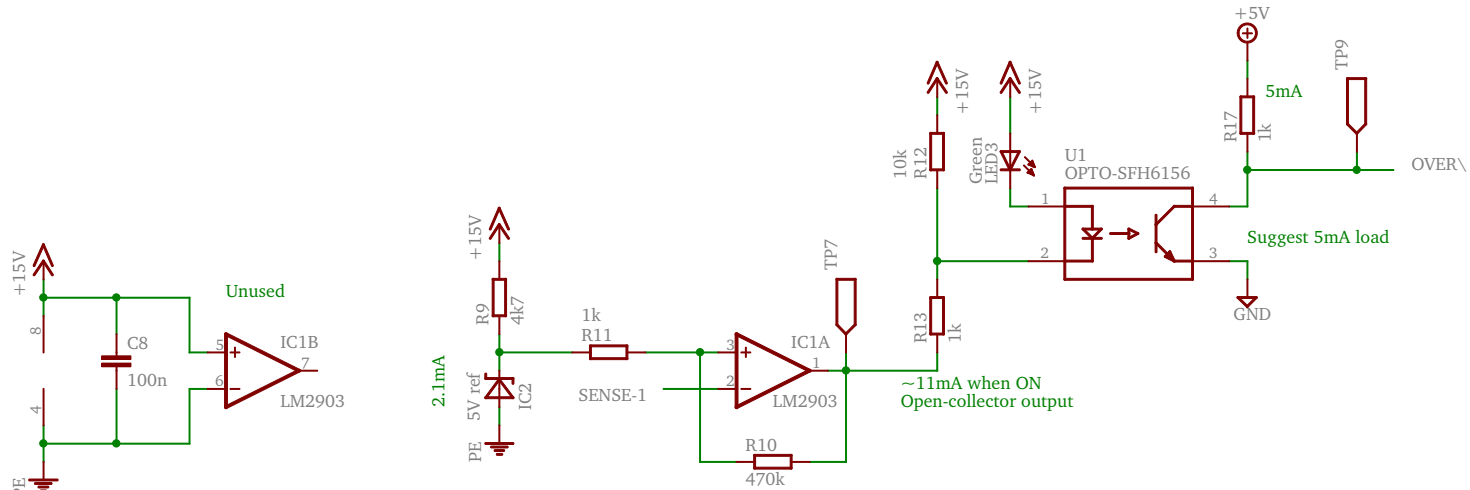
Refer AN486: high-side bootstrap design using Si823x ISODrivers
 Refer to IR Design Tip 04-04 for much information on driving transistors
 Refer IR DT97-3 Managing transients in control IC driven power stages



Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

IGBT driver	
TITLE: inverter-v301	
Document Number:	REV:
Date: 11/05/2018 16:18:28	Sheet: 2/7

5V shunt voltage ref, Diodes Inc. LM4040D50FTA, Digikey #LM4040D50FCT-ND
 5V shunt ref (alternative), Digikey #576-2570-1-ND
 Comparator open-drain 105C LM393 compatible, Fairchild LM2903MX 2-36V, Digikey #LM2903MXFSCT-ND
 Opto-isolator 100% CTR min, Vishay SFH6156-3, Digikey #SFH6156-3-ND
 Opto-isolator (alternative), Digikey #751-1347-1-ND



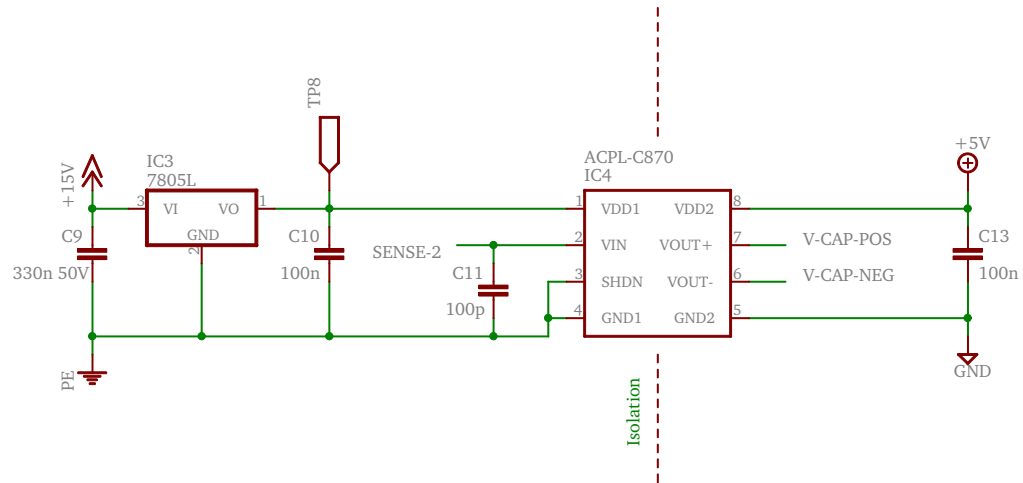
For 100k feedback resistor, transition at 4.95 and 5.10V
 For 470k feedback resistor, transition at 4.99 and 5.02V, so LED turns ON when DC-rail over 310VDC and off at 308VDC

Beware of oscillation when feedback resistor is large; input capacitance becomes significant leading to phase issues.

Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

Sufficient DC-rail voltage measurement (HIGH/LOW output)	
TITLE: inverter-v301	
Document Number:	REV:
Date: 11/05/2018 16:18:28	Sheet: 3/7

Analog isolator, Avago Technologies ACPL-C870-000E 3% accurate, Digikey #516-2578-5-ND
 Analog isolator, Avago Technologies ACPL-C87A-500E 1% accurate, Digikey #516-3140-1-ND
 7805 regulator, STMicroelectronics L78L05ABZ 100mA TO92-3, Digikey #497-1009-ND

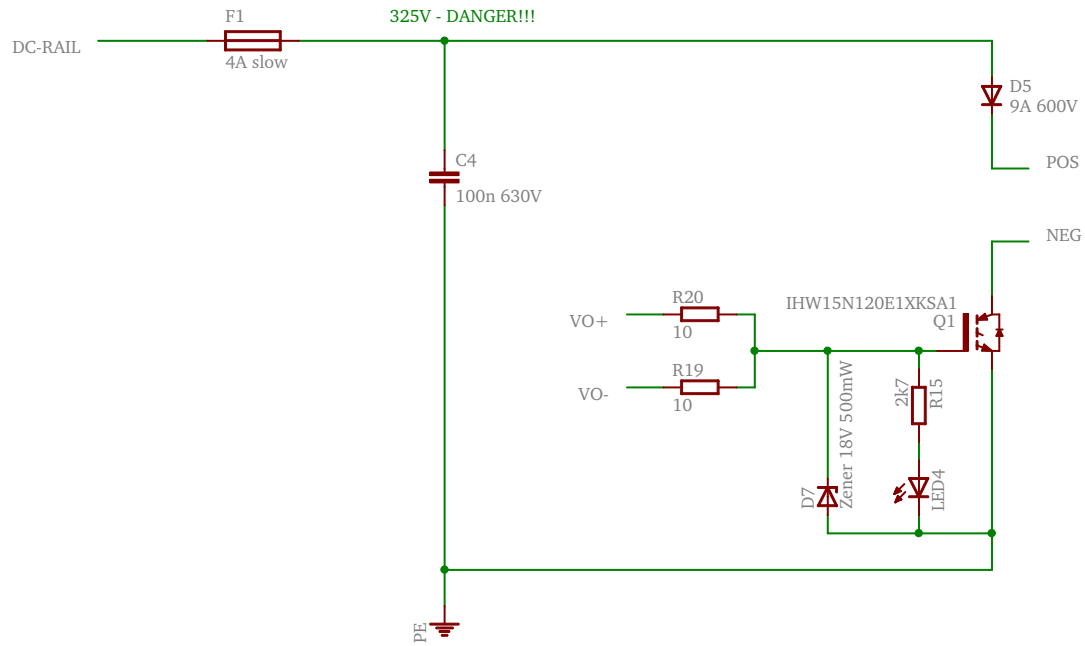


Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

Isolated DC-rail voltage sense	
TITLE: inverter-v301	
Document Number:	REV:
Date: 11/05/2018 16:18:28	Sheet: 4/7

IGBT 1200V TO-247, Infineon Technologies IHW15N120E1XKSA1 1200V 30A 156W TO247-3, Digikey #IHW15N120E1XKSA1-ND
 4A slow 400VDC ceramic fuse, Littelfuse Inc 0477004.MXP, Digikey #F2989-ND
 100n 630VDC high dv/dt cap, Epcos B32652A6104J, Digikey #495-1333-ND

Investigate the possibility of replacing Zener diodes with TVS which may be faster acting



Low side switched output

TITLE: inverter-v301

Document Number:

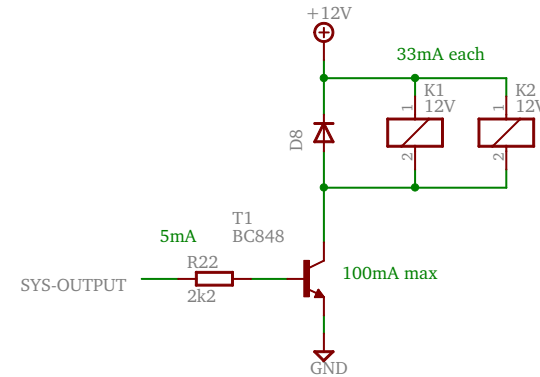
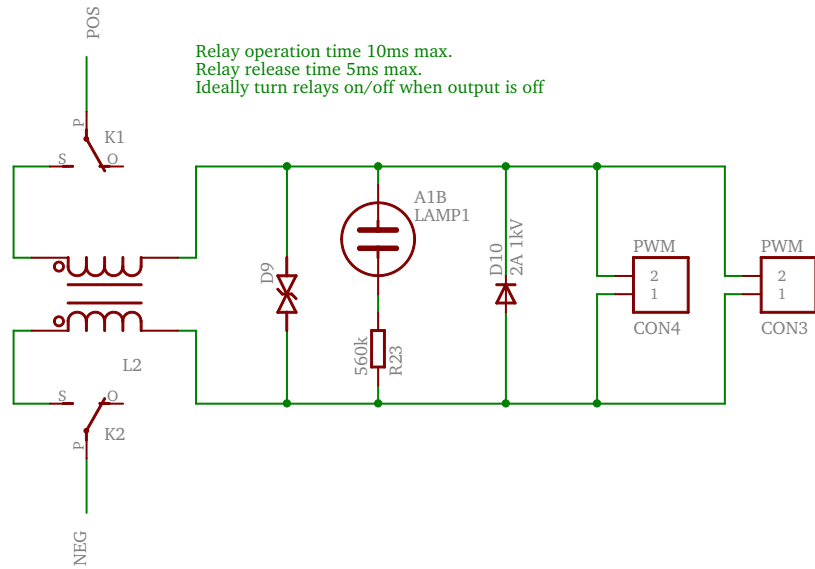
REV:

Date: 11/05/2018 16:18:28

Sheet: 5/7

Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

560k resistor 2W, Yageo 560k 2W 5% axial FMP200JR-52-560k, Digikey #560KZCT-ND
 Relay 250VAC 10A 12VDC 33mA, Omron G5LE-1-VDDC12, Digikey #Z3672-ND
 Neon indicator, Visual Communication Company A1B neon, Digikey #A1B-ND
 Common mode choke, Laird CM2545X171B-10 10A 10mR, Digikey #240-2485-ND
 Bidirectional TVS 376V reverse standoff, Littelfuse Inc. 1.5KE440CA, Digikey #1.5KE440CALFCT-ND
 Connector 2 POS 0.2" pitch, Phoenix 1729128, Digikey #277-1247-ND
 2A 1kV DO15 diode, Micro Commercial HER208G-TP, Digikey #HER208G-TPMSCT-ND



Consider adding a current imbalance detector (earth leakage detector)
 ...Actually tricky to have earth leakage as the output is isolated from ground

PWM single polarity output

Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

TITLE: inverter-v301

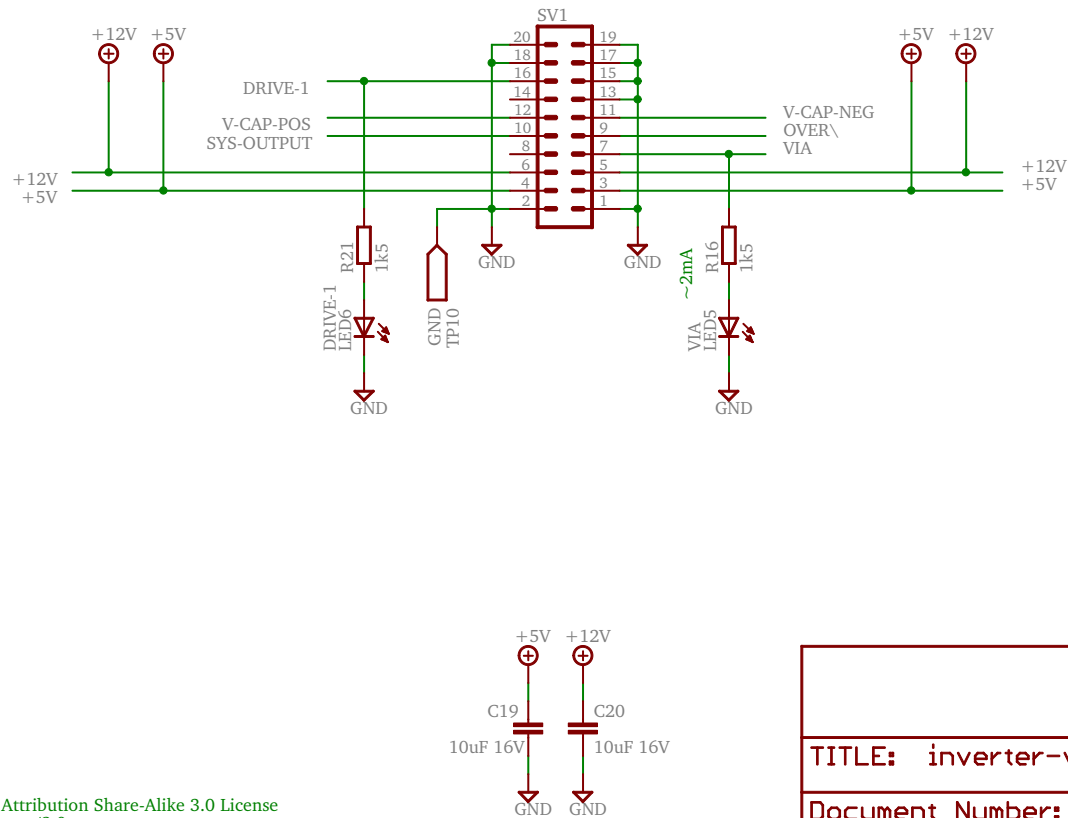
Document Number:

REV:

Date: 11/05/2018 16:18:28

Sheet: 6/7

20-way header R/A, On Shore Technology 302-R201, Digikey #ED10536-ND
 Matching 20-way IDC connector, On Shore Technology 101-206, Digikey #ED10503-ND



Released under the Creative Commons Attribution Share-Alike 3.0 License
<http://creativecommons.org/licenses/by-sa/3.0>
 Design by Martin van den Nieuwelaar, martin@gadgets.co.nz

Primary I/O connector	
TITLE: inverter-v301	
Document Number:	REV:
Date: 11/05/2018 16:18:28	Sheet: 7/7