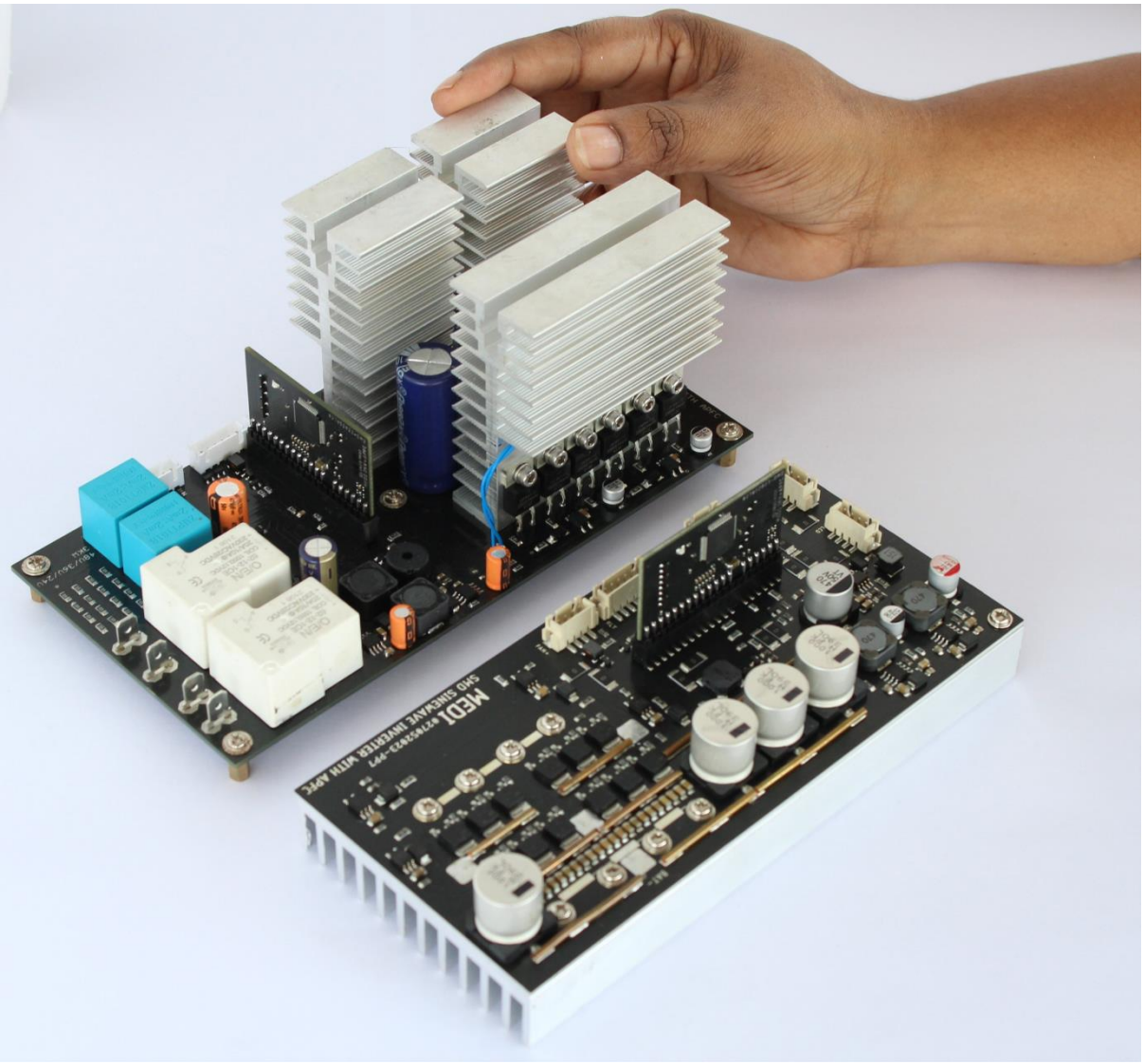


MEDI’s SMD sinewave inverter up to 3KVA

SPECIFICATION	
Capacity	Up to 3KVA
Phase	Single
Output waveform	Sine wave
Input voltage	12V to 48V
Output voltage	220V / 230V
Output frequency	50Hz / 60Hz
Grid type	Offgrid
Charging current	Up to 35A
Change-over time	<2 millisecond

Inverter efficiency	Overall efficiency > 90% PCB efficiency > 98%
Charging current harmonic from grid	<4%
Output voltage harmonic	<2%
Charging current crest factor from grid	<1.45
Solar compatibility	Compatible with MEDI MPPT solar charger, priority solar charging with single display for solar and inverter parameters
Overload	Buzzer warning. Cutoff after 2sec
Short circuit	3 seconds. Cutoff after 3sec
Temperature control	Automatic fan ON above 60 degC, fan OFF at 50 degC
Data logging	Fault log event recorder with RTC time and date stamp
Communication	IOT and Wi-Fi for Android mobile connectivity and control
Display	2 line LCD and 4 line LCD

Fully SMD design including the power stage, all the components including the power MOSFETs and connectors are surface mount components. This is very easy and fast for pick & place assembly and easy for fixing.

For solar applications: This inverter is compatible with MEDI's MPPT solar charger or zero drop PWM charger. You will get priority solar charging in both.
When used with MEDI's MPPT, you will get a single display for all the solar and inverter parameters like panel voltage, solar charging current, grid voltage, grid charging current, inverter output voltage, load current, overload, short circuit bypass / cut-off etc. With the optional datalogger available, all these parameters can be viewed and saved with RTC time and date stamp. This also comes with IOT and Wifi connectivity to Android.

LCD display for stand-alone inverter–

- Inverter output voltage
- Battery voltage
- Grid voltage
- Grid charging current
- Inverter load
- Mains frequency
- Overload
- Short circuit bypass / cutoff

LCD display for inverter with MEDI MPPT

- Inverter output voltage
- Battery voltage

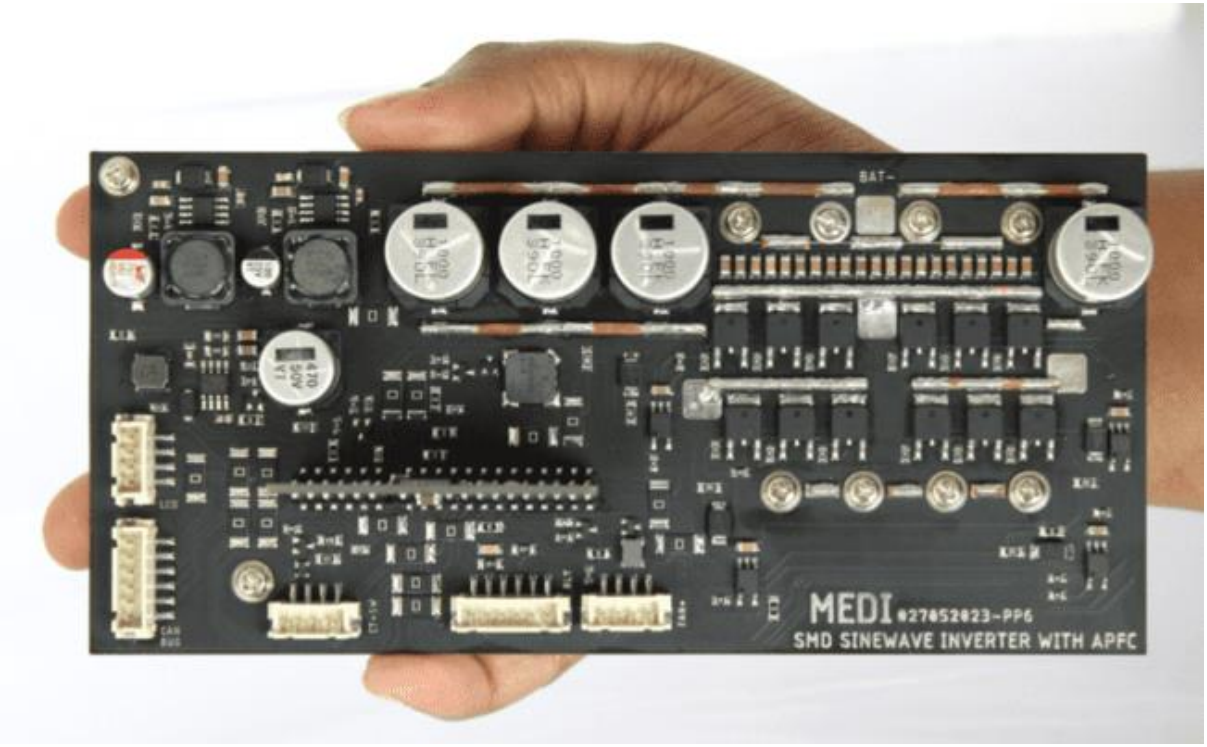
- Grid voltage
- Grid charging current
- Inverter load
- Mains frequency
- Overload
- Short circuit bypass / cutoff
- Panel voltage
- Panel current
- Solar charging current

Buzzer indication –

- On / Off
- UPS mode
- Battery low
- Overload
- Short circuit bypass / cutoff

Aluminium PCB mounted directly on to the heatsink

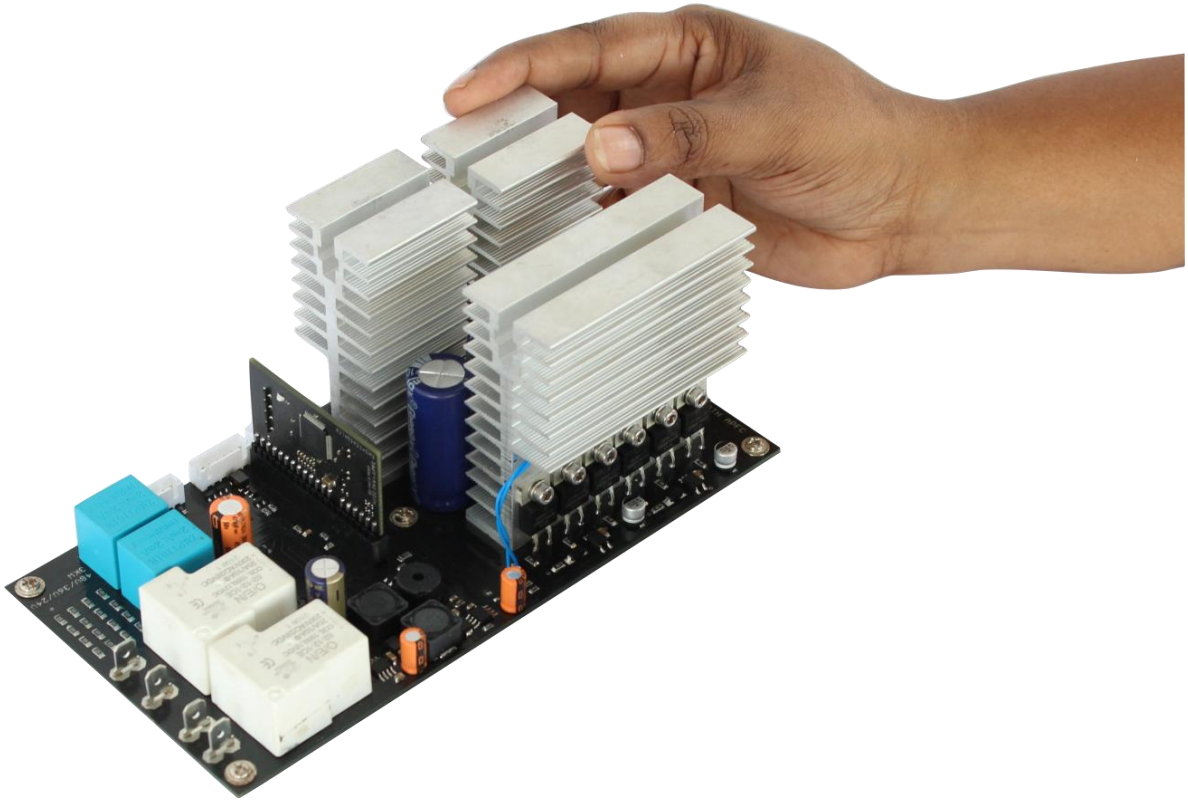
Soldering of MOSFETs directly to aluminium PCB gives excellent heatsink capability compared to conventional screw tightening of MOSFETs. This aluminium PCB is then mounted on to the heatsink which provides excellent contact for heat dissipation.



This SMD inverter design will reduce failure rates due to mechanical errors which are caused during manual fitting of MOSFETs etc. For example, if one MOSFET is not screwed securely

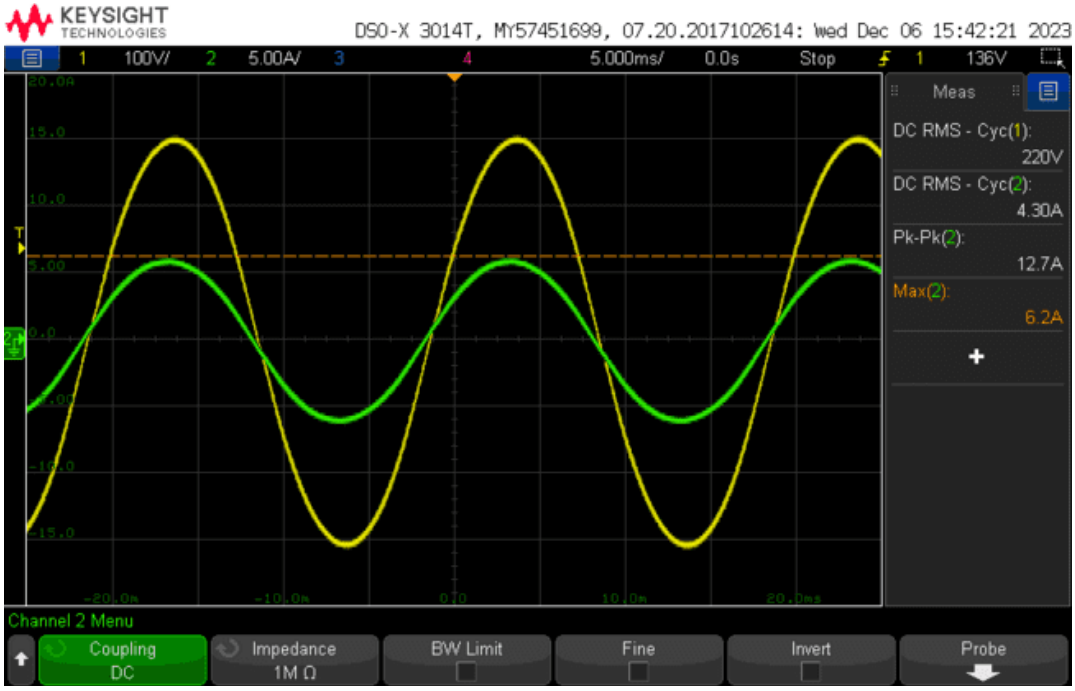
to the heatsink then that MOSFET will overheat because it is not in proper contact with the heatsink. When the load increases this MOSFET will overheat and damage. The temperature sensor which is usually placed on the heatsink cannot detect the heat on this particular MOSFET and it will damage. Due to the damage of one MOSFET all the remaining MOSFETs will damage. A very common issue in the existing designs.
SMD MOSFET power stage will eliminate all such reliability issues and pick and place production will result in quick turnaround.

For customers who prefer through-hole design, we have the option of that as well.



Unlike other inverters, in this inverter 3000VA means 3000W. Other inverters in the market, if you buy a 3KVA inverter you can only load 2400W or less. But in MEDI's SMD sine wave inverter you can load full 3000W.

Inverter output waveform of MEDI SMD inverter

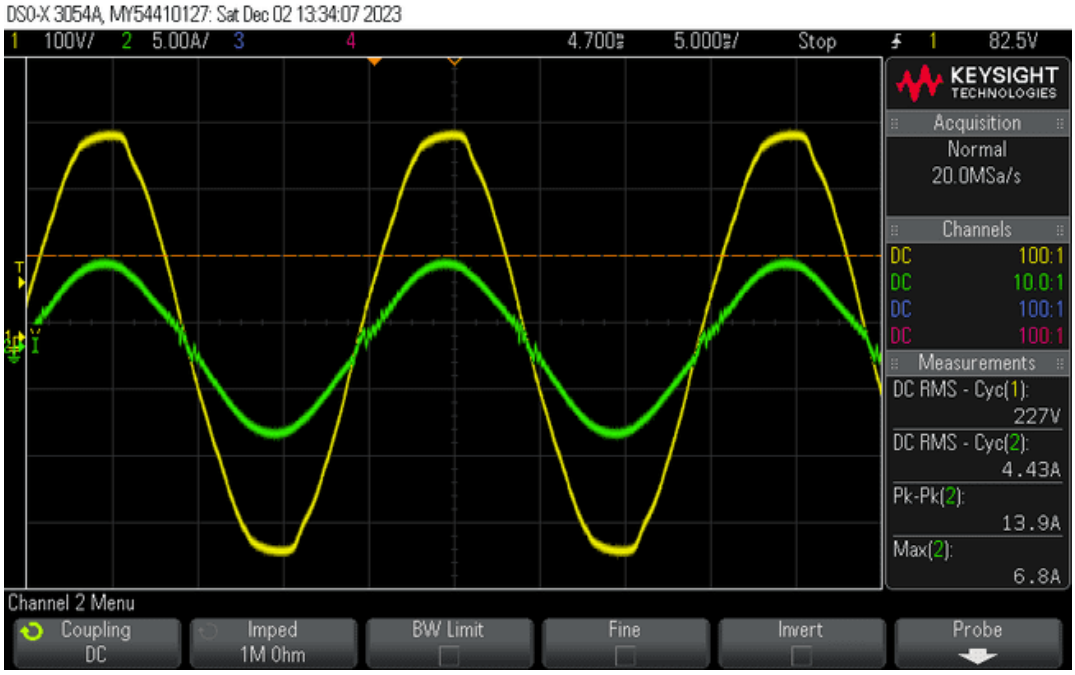


Yellow is the output voltage; green is load current.
Output voltage harmonic distortion < 2% and output PF is 0.998

APFC + synchronous rectifier charger – Active Power Factor Corrected charging and current harmonic reduction. During charging there is very high current crest factor in most of the inverters in the market.
We are using synchronous rectifier topology in this design during charging which means there is no diode drop. During charging MOSFET is switching instead of diode and hence it leads to higher efficiency. Heat reduction during charging due to APFC charging and synchronous rectification and high current charging above 30A is possible.

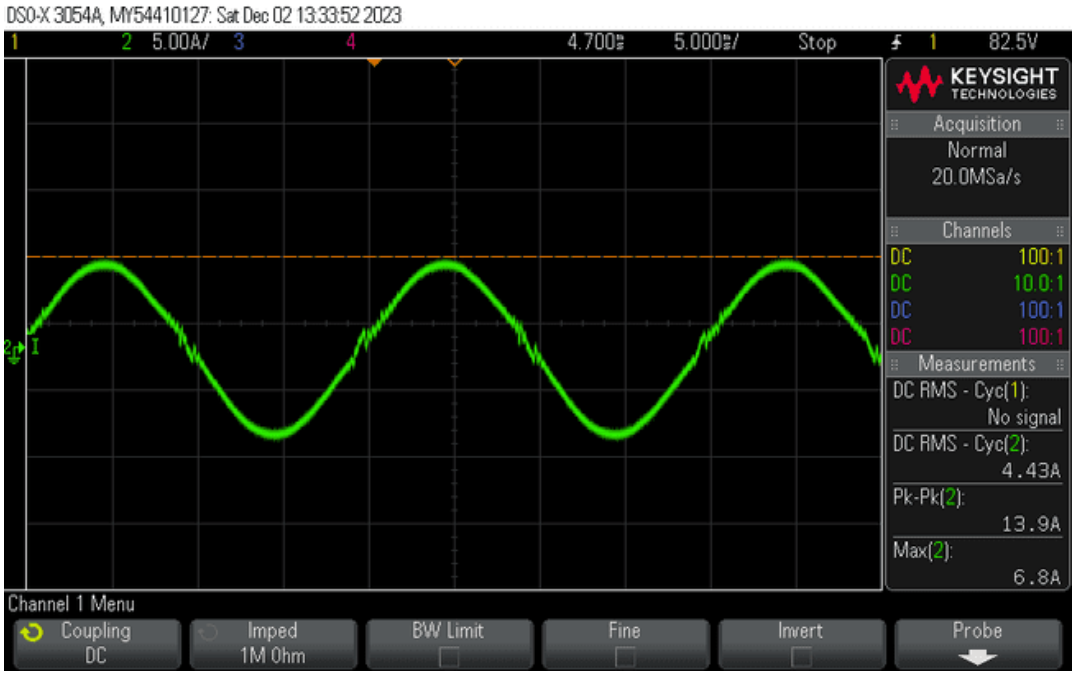
The APFC charger in this design will take very low current from the mains during charging. For example, a 24V battery is charging with 30A from the mains. When compared to a normal inverter, this SMD inverter will take much lesser current as shown below –

APFC & synchronous rectifier charging in MEDI SMD inverter



Yellow is the AC input waveform, Green is the current from mains during charging in MEDI's SMD sine wave inverter. Note: current peak-peak is only 13.9A

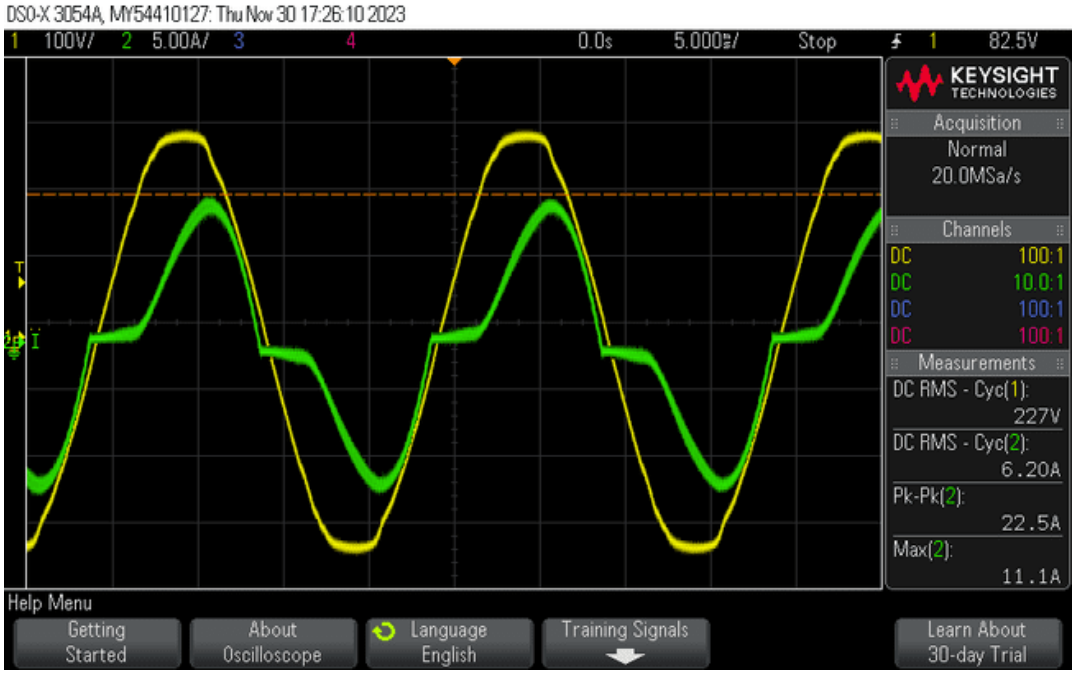
Grid current in MEDI SMD inverter 4.43A @ grid voltage 227V when 31A charging to 26V battery



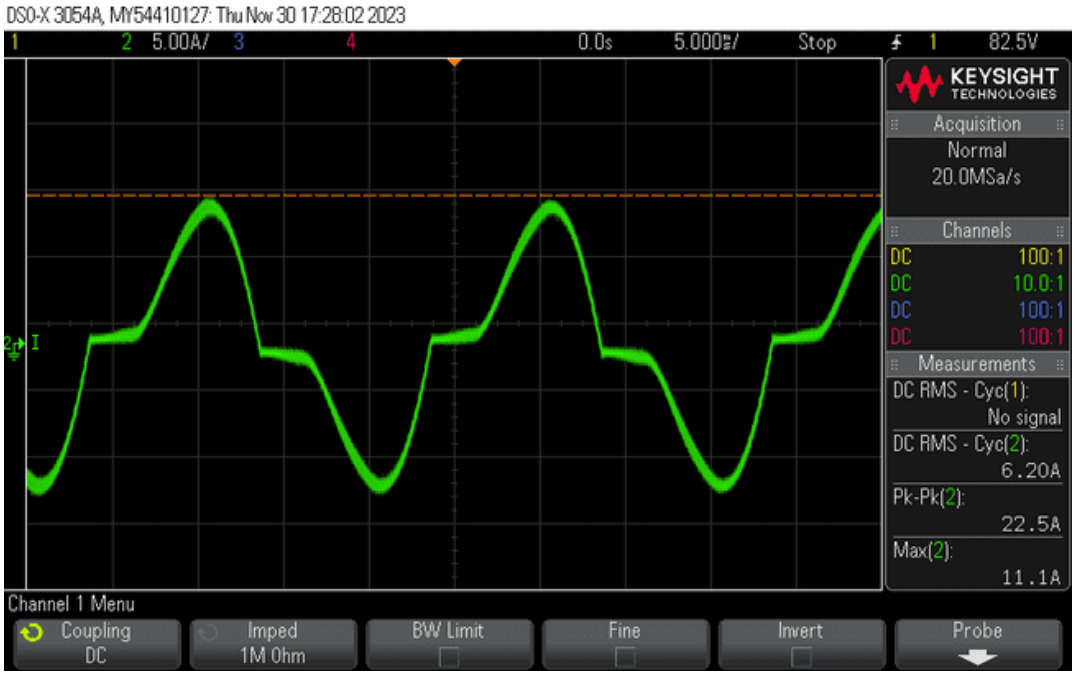
Grid current in MEDI SMD inverter 4.43A @ grid voltage 227V when 31A charging to 26V battery.

Note: current peak-peak is only 13.9A

Without APFC charging in other inverters



Yellow is the AC input waveform, Green is the current from mains during charging in conventional inverters in the market. Note: current peak-peak = 22.5A
Grid current in other inverter 6.2A @ grid voltage 227 V when 31A charging to 26v battery



Grid current in other inverter 6.2A @ grid voltage 227 V when 31A charging to 26v battery

During APFC charging the current from the mains will be pure sinewave current in MEDI SMD inverter unlike other inverters which have pulsating current with very high peak current.

We are using synchronous rectifier topology in this design during charging which means there is no diode drop. During charging MOSFET is switching instead of diode and hence it leads to higher efficiency. Heat reduction during charging due to APFC charging and synchronous rectification and high current charging above 30A is possible.

High current charging suitable for Lithium batteries

There is a switch available to choose between Lithium batteries and lead acid batteries. The inverter comes with charging algorithm for Lithium batteries.
The charging current in this inverter can comfortably go up to 35A without heating and very low losses. For this reason, it is ideal for lithium based batteries. You can use this inverter with any type of Lithium battery – Lithium ion, Lithium polymer, lithium iron phosphate etc.

You can set the charging current based on the battery type and battery requirement.

The menu driven setup provides factory set of various parameters – battery low, battery full, inverter voltage, inverter load, charging current, inverter start at, inverter stop at etc.

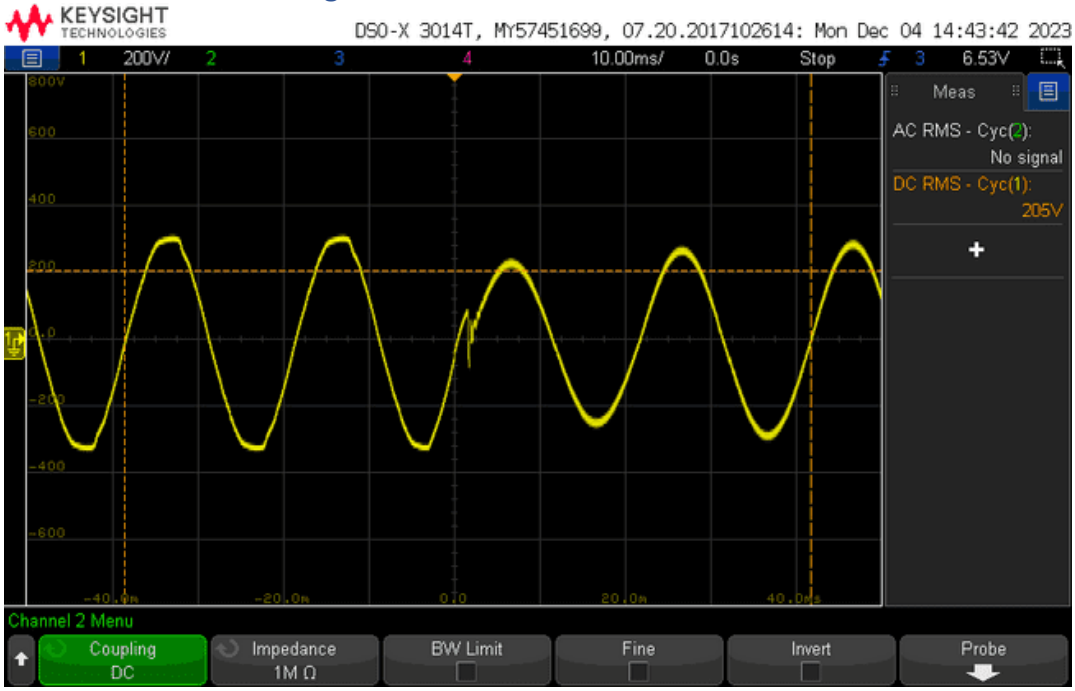
During power failure when inverter is working it will disconnect both phase and neutral from the grid so there will not be any possibility for return current flow from the neutral / phase towards grid. This feature is very important as it provides 100% safety to grid maintenance workers. The conventional inverters available in the market will disconnect only phase during inverter working when there is a power failure, this way there is a possibility of return current flow to grid neutral if inverter phase output is in contact with ground. So for grid maintenance when the grid is switched off, the chances are the lineman will still get a shock.

The battery is fully isolated from AC input and AC output because of 4000V galvanic isolation sensing. There will not be any leakage of AC voltage to the battery. Other low cost inverters use differential amplifier sensing methods which will give a small leakage to the battery. This can be checked by using a tester to the battery and see it will light up.

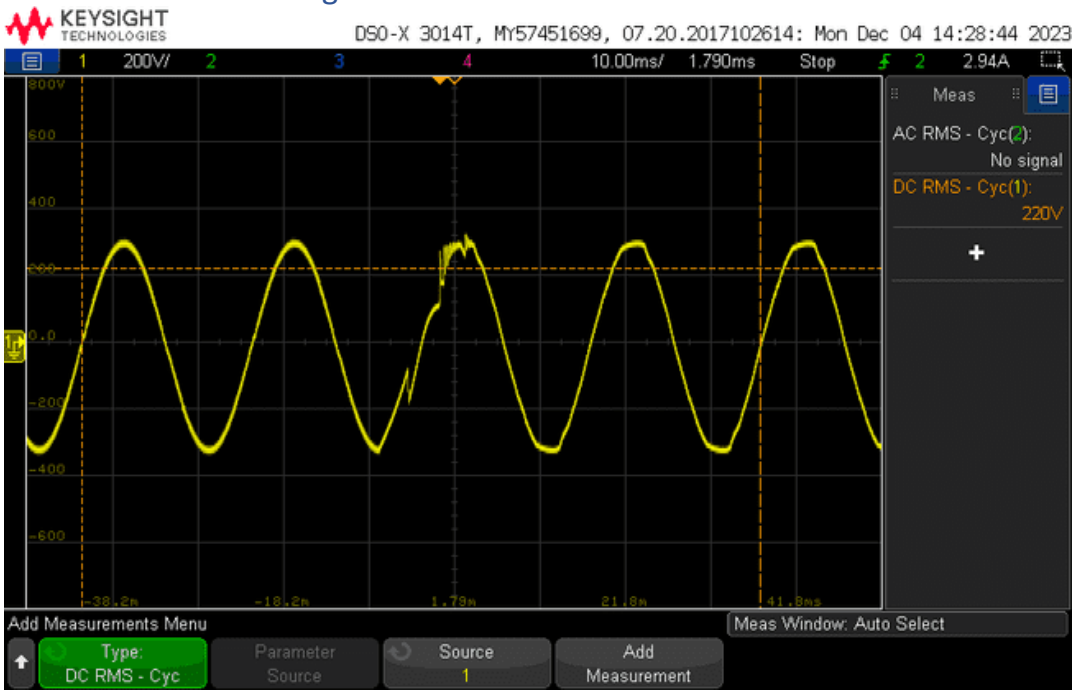
Mains to inverter and inverter to mains change over time will be less than 2millisecond with 40A relay. This is possible due to the unique topology used in this design. In conventional methods used in the industry, the inverter uses a sugarcube relay which is a small ampere relay of 5A or 8A which will move fast within 7ms. Big relays of 40A will take atleast 15ms to move; during that time the computer will reboot. With sugarcube relay you will not be able to load higher wattage. 40A relay will enable us to load 3KVA comfortably. In this design we have a DC-DC converter which will make 39V from 12V / 24V or any battery system. This has a current feedback also, with this we are giving a starting 39V to the relay so the relay will move very fast at 1.2ms, the relay will move from NC and disconnect the contact of NC. After that this 39V will come down to 12V, the DC -DC converter has an internal current limiting and voltage control. So the voltage is brought down to 12V and continued at this state in ON condition.

Mains to inverter and inverter to mains change over time waveform shown below –

Mains to inverter change over



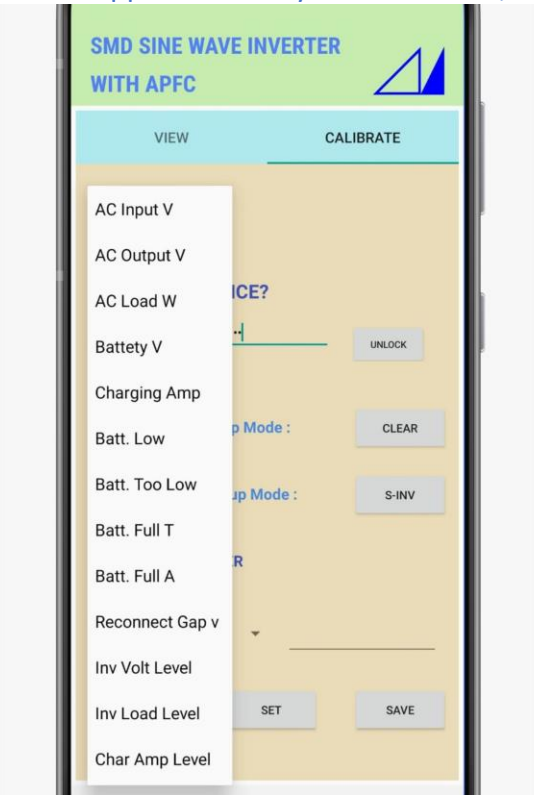
Inverter to mains changeover

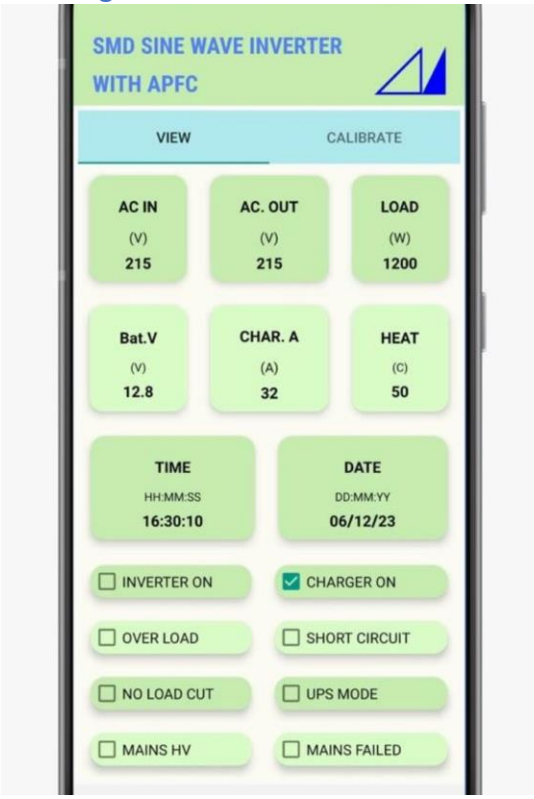


Connectivity : Optional Wifi and net connectivity features are provided. When you use a graphic display you can use a single display for MEDI SMD inverter + MEDI MPPT and all the parameters from grid and solar are displayed.
An Android app will also be provided that can be used for monitoring and control.

Some of the parameters displayed in GLCD

Android app connectivity for calibration, monitoring and control





Technology cost for MEDI's SMD sinewave inverter up to 3KVA : Rs.2,00,000 + tax
Approx. BOM of 3KVA : Rs.1900
Approx. BOM of 1.5KVA : Rs.1700
Transformer, LCD and cabinet extra