



Vincotech

# A Step in central Solar Inverter

VINcoNPC X12 featuring  
Mitsubishi gen 7 IGBT chips for  
1500 V / up to 1 MW w/o paralleling

EMPOWERING YOUR IDEAS

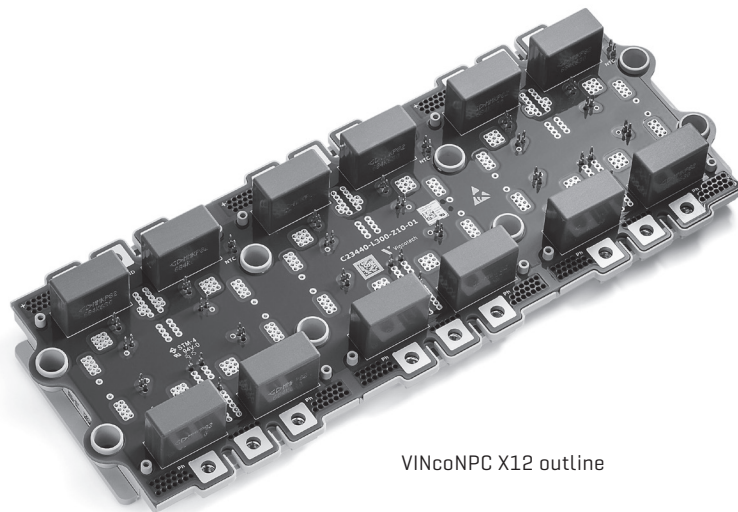
# A STEP UP FOR 1500 V SOLAR

## Three-level Modules for 1+ MW 1500 VDC Solar PV Central Inverters

**Higher power density** is driving the development of solar energy systems that can handle more than 1000 VDC.

Two-level solutions are no longer competitive for central inverters and simply adapting two-level housings to three-level topologies is not efficient and reliable. This limits the maximum frequency and negates some of the advantages of three-level configurations. Vincotech has tapped its deep well of experience with three-level modules to come up with high-power solutions.

The low inductive VINco X housings are built to handle **higher switching frequencies**, enabling you to **reduce your overhead in passive components** and achieve outstanding **efficiencies**.



VINcoNPC X12 outline

# VINco X

VINcoNPC X12 family meets the demanding requirements for central inverters, while retaining the string inverter's speed and flexibility. The terminal connection allows DC and AC stages to be split, which makes busbar design that much easier.

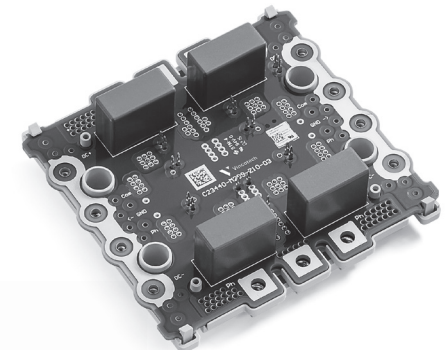
The layouts are meticulously designed to guarantee **even current distribution** and **prevent individual components from overloading**.

## Features

- / Optimized connections for three-level topologies
- / Low internal inductance [5 nH for low inductive commutation loop; 9 nH for the high inductive loop] enables higher frequencies
- / Fully symmetrical layouts for uniform current sharing
- / Modular constructions for better thermal performance

## Benefits

- / Easier busbar design
- / Smaller passive components needed
- / Individual dies are not overloaded
- / Proper thermal performance
- / Cost competitive solution for central inverters



VINco X4 Housing



VINco X8 Housing

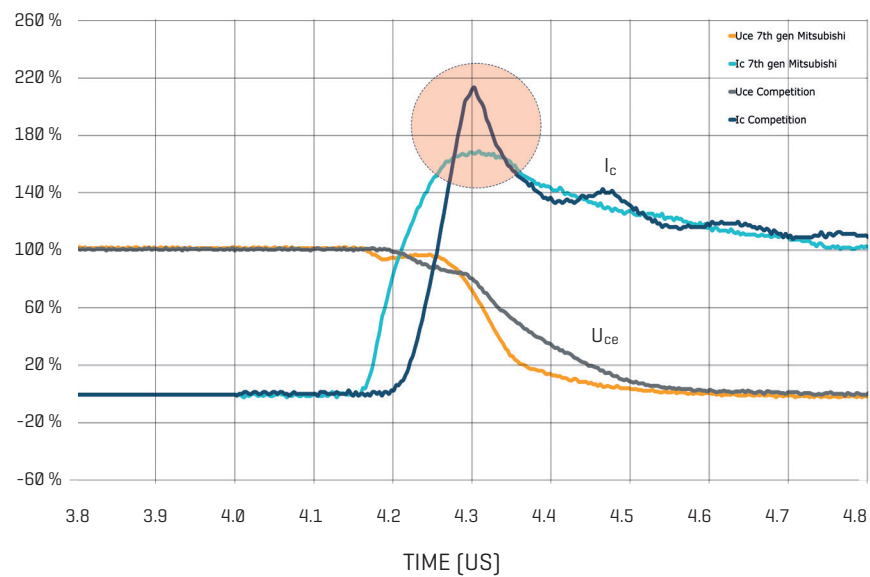
# New VINco X12 with extended Power

The new M7 IGBTs and diodes are a perfect match for the VINcoNPC X12 family. The high power density of the M7 dies gives the possibility to increment the nominal current from 1200 A to 1800 A.

Besides, the conduction losses are **up to 20% lower** and the switching characteristics offer a **superior EMI behavior**.

## Turn-on Switching Waveforms

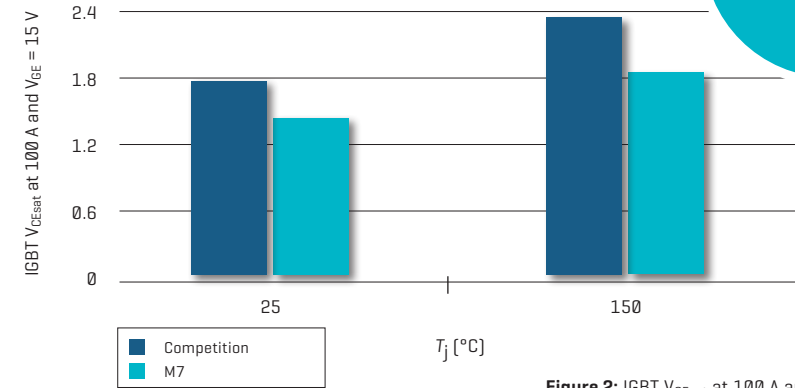
General test conditions:  $V_{Gon/off} \pm 15$  V,  $R_{gon/off} 4 \mu$ ,  $I_C 100$  A,  $V_{CE} 600$  V,  $T_j 150^\circ\text{C}$



**Figure 3:** Turn-on Switching Waveforms  
**Test conditions:**  $V_{Gon/off} \pm 15$  V,  $R_{gon/off} 4 \mu$ ,  $I_C 100$  A,  $V_{CE} 600$  V,  $T_j 150^\circ\text{C}$

- UCE 7th gen Mitsubishi
- IC 7th gen Mitsubishi
- UCE Competition
- IC Competition

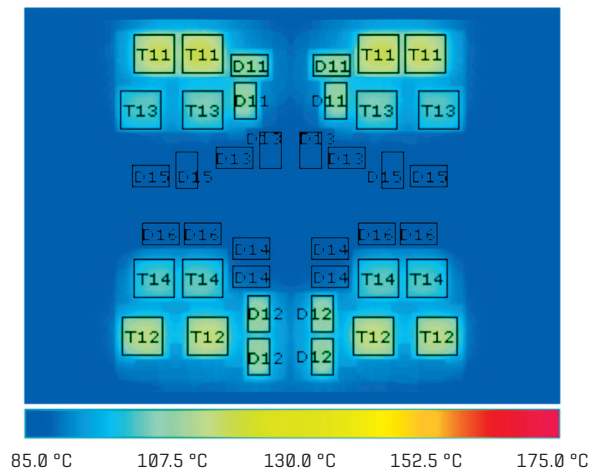
**-20%**



**Figure 2:** IGBT  $V_{ceSat}$  at 100 A and  $V_{GE} = 15$  V

1 MW can be reached without paralleling modules or having to use two-level modules in a high inductive design to achieve the three-level configuration.

By using one module per phase to reach 1 MW, an **outstanding efficiency of 99%** can be achieved at 6 kHz, being even higher at lower switching frequencies. Under these conditions the maximum junction temperature of all components remains below  $120^\circ\text{C}$ , keeping a good safety margin for overload conditions.



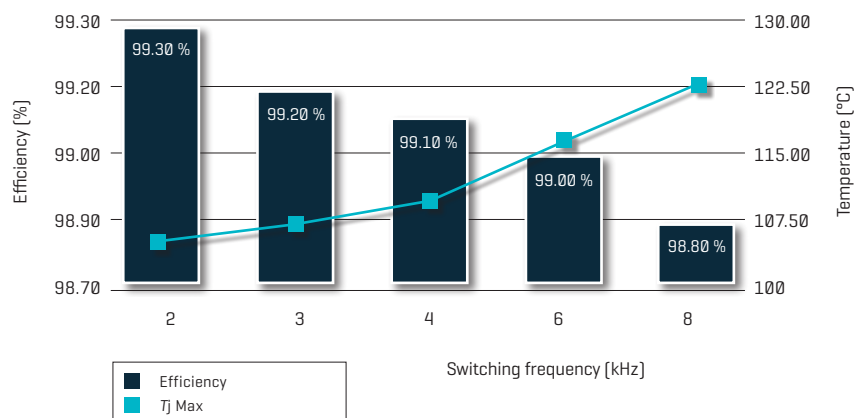
**Conditions:**

$V_{IN} = 1300$  V<sub>DC</sub>;  $V_{OUT} = 400$  V<sub>AC</sub>;  $I_{OUT} = 833$  A/phase;  $f_{SW} = 6$  kHz;  $f_{SW} = 50$  Hz;  $R_{g,ON/OFF} = 0,5 \Omega$ ;  $T_{SINK} = 85^\circ\text{C}$

**Figure 5:** Thermal distribution of one unit of the 70-W624NIA1K8M701-LD00FP70 for 1 MW output power



## New VINco X12 with extended Power



### Conditions:

$V_{IN} = 1300 V_{DC}$ ;  $V_{OUT} = 400 V_{AC}$ ;  $I_{OUT} = 833 A/phase$ ;  $f_{SW} = 50 Hz$ ;  $R_{g\_ON/OFF} = 0,5 \Omega$ ;  $T_{SINK} = 85^{\circ}C$

### Figure 6:

LD00FP70 efficiency and maximum junction temperature vs. switching frequency for 1 MW

## VINCO X Product Portfolio

VINco X4 HOUSING / VINco X8 HOUSING / VINco X12 HOUSING

Part Number	Topology	Chip technology	Voltage	Current	Housing
70-W224NIA400SH-M400P	NPC	IGBT 4	2400 V	400 A	VINco X4
70-W424NIA800SH-M800F	NPC	IGBT 4	2400 V	800 A	VINco X8
70-W624N3A1K2SC-L400FP	NPC	IGBT 4 HS	2400 V	1200 A	VINco X12
70-W624N3A1K2SC01-L400FP10	NPC	IGBT 4	2400 V	1200 A	VINco X12
70-W624NIA1K2M702-L400FP70*	NPC	IGBT M7	2400 V	1200 A	VINco X12
70-W612NMA1K8M702-LC09FP70	MNPC	IGBT M7	1200 V	1800 A	VINco X12
70-W624NIA1K8M701-LD00FP70	NPC	IGBT M7	2400 V	1800 A	VINco X12

\* Under development





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