# SK515

## COM Express Type 6 Carrier Board w/PCIe104

- **High-End CPUs with latest generation x86 processors in a ruggedized small form factor**
- **Standard MXM Version 3.1 Support**
- **PCI/104 Express Expansion Slot for Modular Open Structure**
- **Extreme Temperature Support -40~+85 degree**

# Instructions

COM Express, a computer-on-module (COM) form factor, is a highly integrated and compact PC that can be used in a design application much like an integrated circuit component. The COM Express Module integrates core CPU and memory functionality, the common I/O of a PC/AT, USB, audio, graphics (PEG), and Ethernet.

SK515 feature a range of Intel processors, up to the latest Intel Core series. SK515 are built to operate in harsh environmental conditions, the operating temperatures as low as -40°C to as hot as 85°C. From low power consumption to high performance processing power, SK515 are built to suit a wide range of computing applications from signal processing to unmanned vehicles and more.
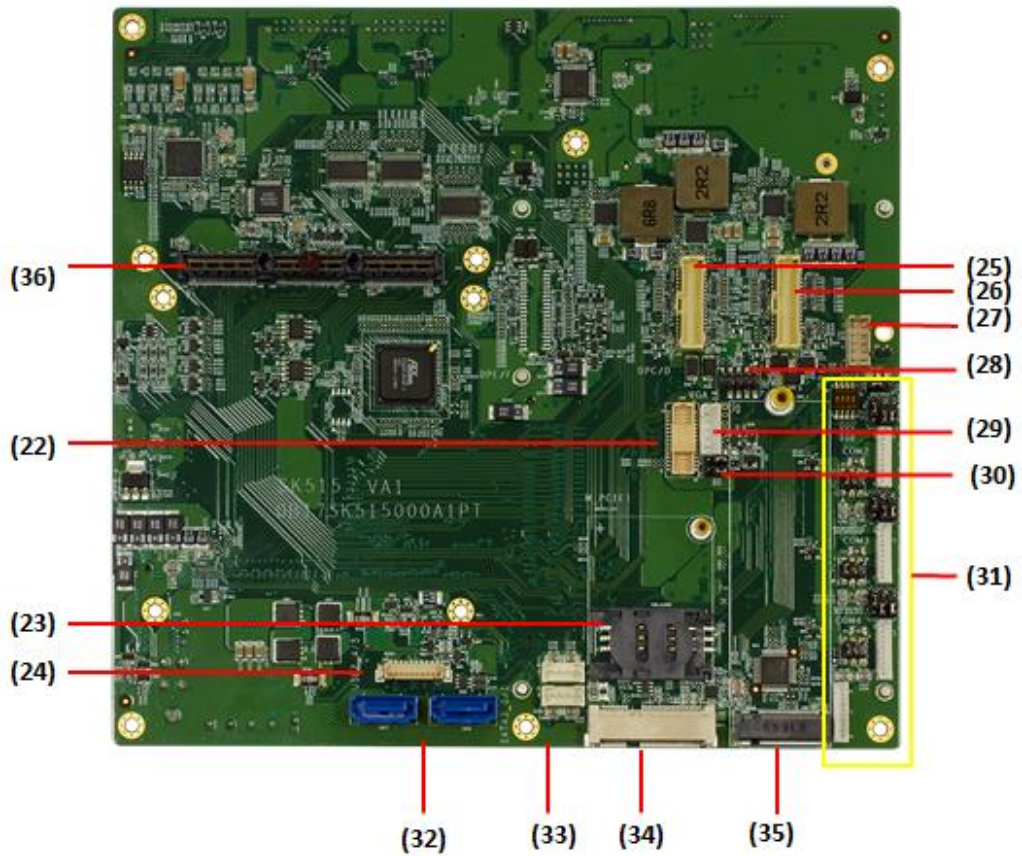
## Key Features of SK515

**(1) Efficiency product design**          **(2) Fast system integration**

**(3) Rich Expansion Slot**
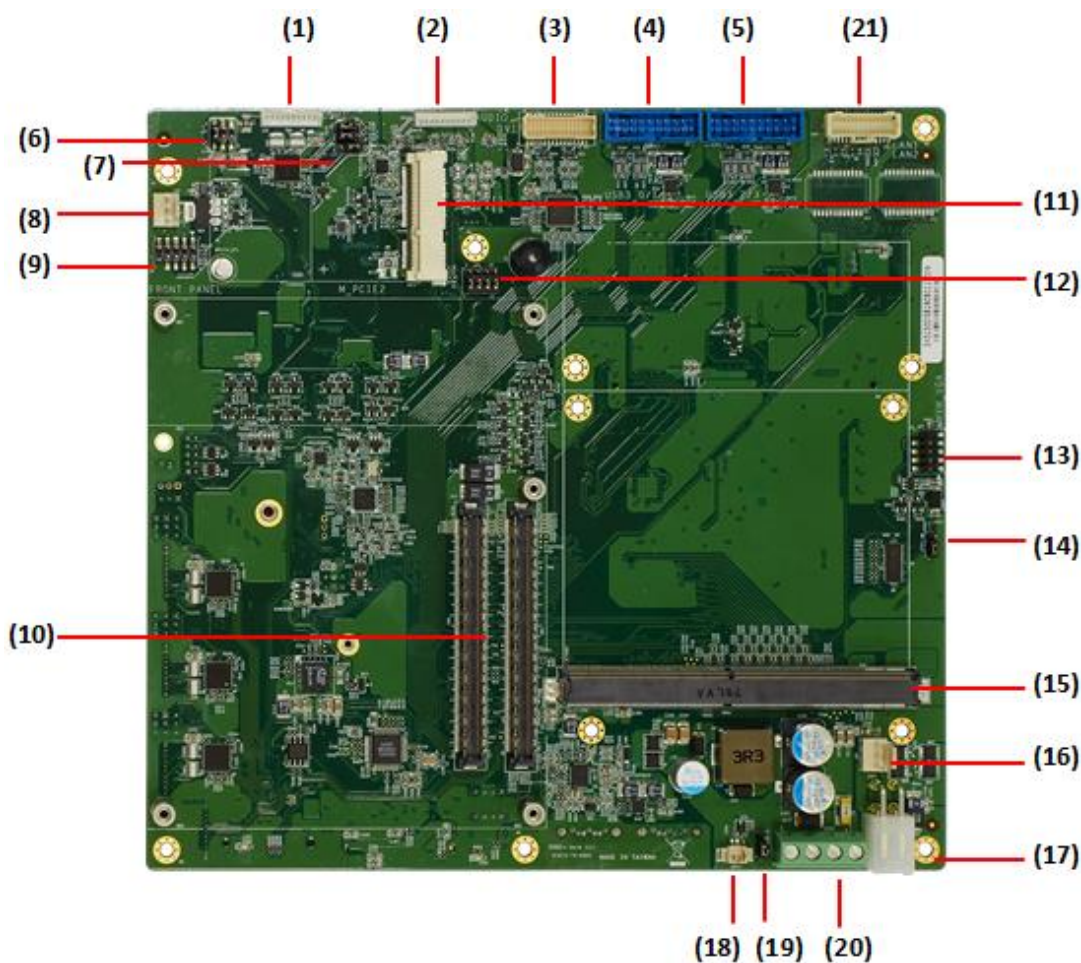
| 1 | J26 |
|---|---|
| 2 | AUDIO (MIC-In/LINE-Out) |
| 3 | J27 |
| 4 | JUSB3_1 |
| 5 | JUSB3_2 |
| 6 | JP7 |
| 7 | JP8,JP9,JP10 |
| 8 | J22 |
| 9 | J23 |
| 10 | CN1, CN2 (COM Express connector) |
| 11 | CN15 (miniPCIe) |
| 12 | JP6 |
| 13 | J20 |
| 14 | JP30 |
| 15 | MXM1 |
| 16 | J25 |

| 17 | CN21 |
|---|---|
| 18 | JBAT1 |
| 19 | JP28 |
| 20 | DCIN |
| 21 | LAN1 (LAN1/LAN2) |
| 22 | J10 |
| 23 | SIM_CARD1 |
| 24 | J15 |
| 25 | J18 (DPC/D) |
| 26 | J17 (DPA/B) |
| 27 | J9 |
| 28 | J8 |
| 29 | J11 |
| 30 | JP23, JP24 |
| 31 | See page 8~9 |
| 32 | CN26, CN27 |
| 33 | J2, J3 |
| 34 | CN14 |
| 35 | CN3 |
| 36 | STACKPC1 |

# CPU/GPU Table

All Operating Temperature meet from 0°C to +55°C.
Could Customize the Operating Temperature from -40°C to +70°C.

## CPU Products List

|  | CPU |  | SPEC |
|---|---|---|---|
| 9th CPU | Intel® Xeon® E-2276ME | 45W | Coffee Lake 9th Gen, 6 x 2.8 / 4.5 GHz, 12MB cache |
| 9th CPU | Intel® Xeon® E-2276ML | 25W | Coffee Lake 9th Gen, 6 x 2.0 / 4.2 GHz, 12MB cache |
| 9th CPU | Intel® Core™ I7-9850HE | 45W | Coffee Lake 9th Gen, 6 x 2.7 / 4.4 GHz, 9MB cache |
| 9th CPU | Intel® Core™ i7-9850HL | 25W | Coffee Lake 9th Gen, 6 x 1.9 / 4.1 GHz, 9MB cache |
| 7th CPU | Intel® Core™ i7-7820EQ | 45W | Kaby Lake 7th Gen, 4 x 3.0 / 3.7 GHz, 8MB cache |
| 6th CPU | Intel® Core™ i7-6822EQ | 25W | Sky Lake 6th Gen, 4 x 2.0 / 2.8 GHz, 8MB cache |
| 6th CPU | Intel® Core™ i7-6820EQ | 25W | Sky Lake 6th Gen, 4 x 2.0 / 2.8 GHz, 8MB cache |
| 6th CPU | Intel® Xeon® E3-1505M v6 | 45W | Kaby Lake 6th Gen, 4 x 3.0 / 4.0 GHz, 8MB cache |
| 6th CPU | Intel® Xeon® E3-1505L v6 | 25W | Kaby Lake 6th Gen, 4 x 2.2 / 3.0 GHz, 8MB cache |

## GPU Products List

| GPU | CUDA Cores |  | Average Score |
|---|---|---|---|
| NVIDIA ® GeForce™ RTX 2060 | 1920 CUDA Core | 160W | 14732 |
| NVIDIA ® Quadro® P5000 | 2560 CUDA core | 180W | 12040 |
| NVIDIA ® Quadro® P3000 | 1280 CUDA core | 75W | 6522 |
| NVIDIA® GeForce™ GTX 1080 | 2560 CUDA Core | 180W | 14691 |
| NVIDIA® GeForce™ GTX 1660SUPER | 1408 CUDA Core | 120W | 12705 |
| NVIDIA® GeForce™ GTX 1050Ti | 768 CUDA Core | 75W | 6431 |
| NVIDIA® GeForce™ GTX 1050 | 640 CUDA Core | 75W | 5701 |
| SK210-GT730M-StackPC | 384 CUDA Core | 49W | 807 |

# Description of Key Features

## (1)Efficiency product design

In order to design all kinds of products in the shortest time, the COM Express provide a better way to improvement the process. SK515 does not only provide the COM Express carrier board, but also MXM, PCIe, M.2 and mimi PCI slot, will make the preliminary verification work more efficient. The solutions include:

- Mimi PCIe Expansion: 2x full size mimi PCIe (1 with mSATA support)

- M.2 Expansion: 1x 2290 M key (SATA only)
- PCIe/104 Expansion: 4x PCI x1, 1x PCIe x4, 5 xUSB, 1 LPC, 1X SPI

## (2) Fast system integration

SK515 is the fanless design for pass environment test, ex: IP65, MIL-STD810. No need to find the problem until the end, and confirm the design direction as soon as possible.

At the same time, SK515 use the mezzanine standard, mainly is used in industrial computers. Being mezzanines, they are always plugged on a carrier PCB that supports this format. The modules communicate with their carrier over a dedicated bus, and can have all kinds of special functions. All I/O signals are mapped to two high densities, low profile connectors on the bottom side of the module. COM Express employs a mezzanine-based approach. The COM modules plug into a baseboard that is typically customized to the application. Over time, the COM Express mezzanine modules can be upgraded to newer, backwards-compatible versions. COM Express is commonly used in Industrial, Military/Aerospace, Gaming, Medical, Transportation, IoT, and Computing embedded applications.

## (3) Rich Expansion Slot

SK-515 provides rich expansion to make the whole solutions easier. We could use PCIe 104 related product SK506, SK303, SK1050 and SK1660S：

- SK506:
- StackPC-FPE form factor
- PCIe/104 stackable bus structure
- Reliable Ethernet technology from Intel i350-AM4 controllers
- total 6 independent LAN connections (2 from host board, 4 from Intel controllers)
- Flexible options for Ethernets through RJ45 or 10 pin-headers
- High-performing bridgeless design supporting PCI Express Gen 2.1 5GT/s
- Extended temperature -40 to 85°
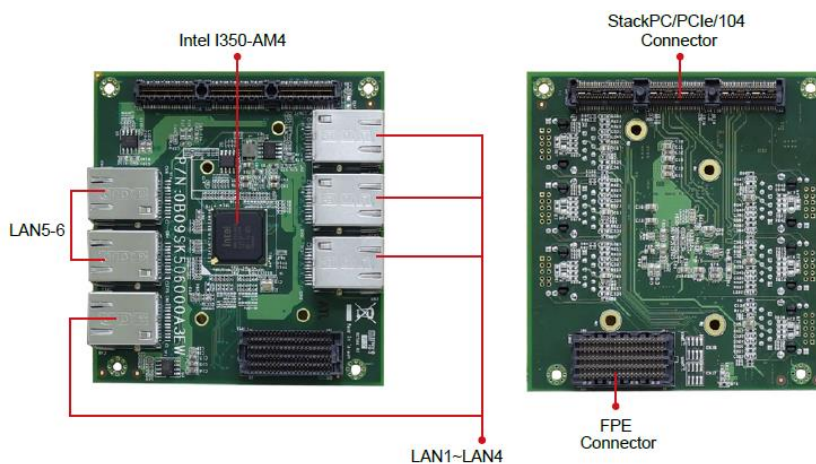
- **SK401**
  - StackPC form factor
  - PCIe/104 stackable bus structure
  - Reserve PCI/104 connector for different stacking criteria
  - Extended temperature -40 to 85℃
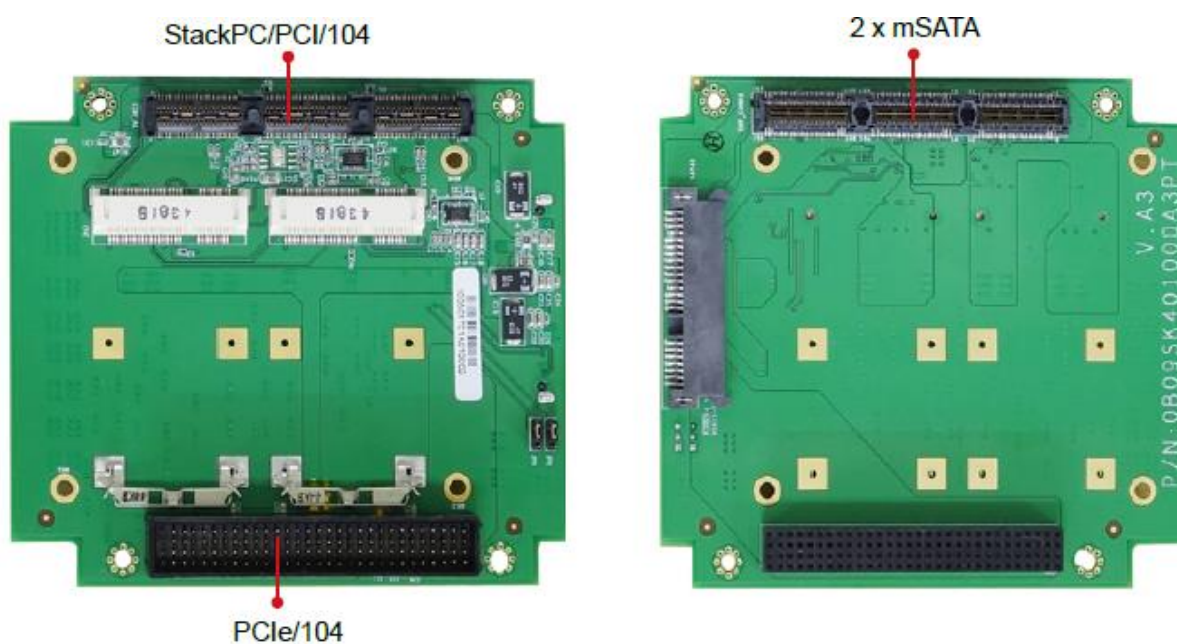


- **SK303**
  - PCI/104-Express, PCI & PCIe connectors (w/StackPC design)
  - PCIe/104 stackable bus structure
  - PCIe to PCI adapter function
  - COM: 4 x RS232/422/485 with 5V/12V selectable and isolation function
  - Extended Temp.: -40℃ ~ 85℃

- **SK1050-NVIDIA GTX1050Ti MXM 3.1 Graphics Module**
  - Powered by NVIDIA GeForce® GTX1050Ti
  - MXM 3.1Type-A Module
  - High-speed 4GB GDDR5 Memory

- 768 new-gen. Pascal architecture CUDA cores
- Outputs 4 Channel Support
- DisplayPort 1.2 Certified, DisplayPort 1.3/1.4 Ready
- Support NVIDIA CUDATM, OptimusTM, DirectX® 12, OpenGL® 4.5
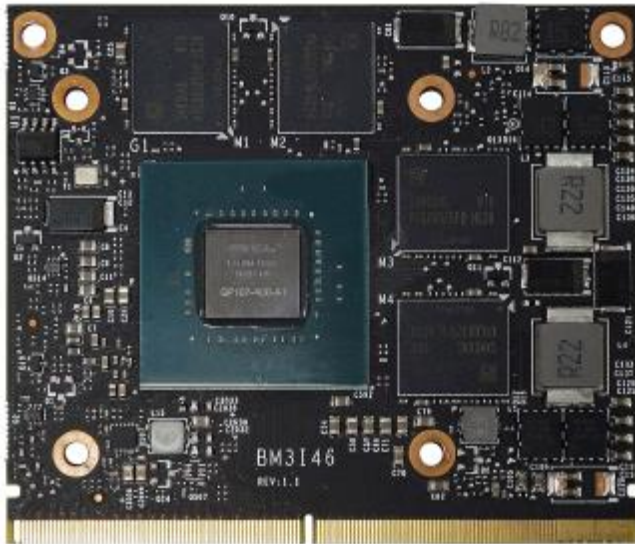


- ● SK1660S
- NVIDIA GTX 1060SUPER MXM 3.1 Graphics Module
- Powered by NVIDIA GeForce® GTX 1060SUPER
- MXM 3.1Type-B Module
- 192-bit, 6GB GDDR6 Memory
- Outputs 4 Channel Support
- Support NVIDIA CUDA, DirectX® 12, OpenGL® 4.6

# Specifications

## System

| COM Express CPU Module | 9th CPU Intel® Xeon® E-2276ME ( 45W Coffee Lake 9th Gen, 6 x 2.8 / 4.5 GHz, 12MB cache) |
|---|---|
| | 9th CPU Intel® Xeon® E-2276ML (25W Coffee Lake 9th Gen, 6 x 2.0 / 4.2 GHz, 12MB cache) |
| | 9th CPU Intel® Core™ I7-9850HE (45W Coffee Lake 9th Gen, 6 x 2.7 / 4.4 GHz, 9MB cache) |
| | 9th CPU Intel® Core™ I7-9850HL (25W Coffee Lake 9th Gen, 6 x 1.9 / 4.1 GHz, 9MB cache) |
| | Intel® Core™ i7-7820EQ (KabyLake 7th Gen, 4 x 3.0/3.7 GHz,8MB cache,45W) |
| | Intel® Core™ i7-6820EQ (SkyLake 6th Gen, 4 x 2.0/2.8 GHz,8MB cache,25W) |
| | Intel® Xeon® E3-1505L v6 (KabyLake 6th Gen, 4 x 2.2/3.0 GHz, 8MB cache,25W) |
| | Intel® Xeon® E3-1505M v6 (KabyLake 6th Gen, 4 x 3.0/4.0 GHz,8MB cache,45W) |
| Compatibility | COM Express® TYPE 6 |

## Display

| Display Port | 2 x Display port form COM Express, 4 x outputs from GPU, 6 x total |
|---|---|
| VGA | 1 x output from COM Express, |
| LVDS | 1x18-24-bit LVDS |

## Ethernet

| Ethernet | Dual Gigabit (10/100/1000) Ports |
|---|---|

## Interface

| USB | 4 x USB 3.0 |
|---|---|
| Serial Port | 4 x RS232/422/485 |
| Audio | 2 x 3.5mm Audio Jacks (1 x MIC, 1 x Line-Out) |
| Input Power _SYS | 9~36V (4P Terminal Block) |
| Input Power_MXM | 12V (ATX AP) |

## Expansion

| Mimi PCIe | 2 x Full-size mini PCIe |
|---|---|
| M.2 | 1 x 2280 M key (SATA only) |
| PCIe/104 | 4 x PCIe x 1<br>1 x PCIe x 4 |

5 x USB 2.0

1 x LPC

1 x SPI

| | |
|---|---|
| Power Type | DC-IN 9~36V |
| Dimension | 160 x 185 mm |
| Operating Temp | -40 to 85°C |
| Storage Temp | -40 to 85°C |
| Relative Humidity | 15% to 95%, non-condensing |

## Ordering Information

| Model | No. | Description |
|---|---|---|
| SK515 | S51501 | SK506 LAN port Module |
| SK515 | S51502 | SK401 PCIe Module |
| SK515 | S51503 | SK303 COM port Module |
| SK515 | S51504 | SK1050-NVIDIA GTX1050Ti MXM 3.1 Graphics Module |
| SK515 | S51505 | SK1660S-NVIDIA GTX1600SUPER MXM 3.1 Graphics Module |

# Block Diagram