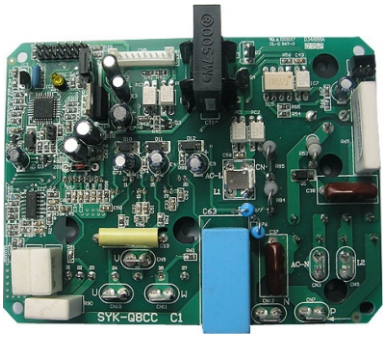
AISLU
Uprating and Absorbed

MK10423
DC Inverter Driver



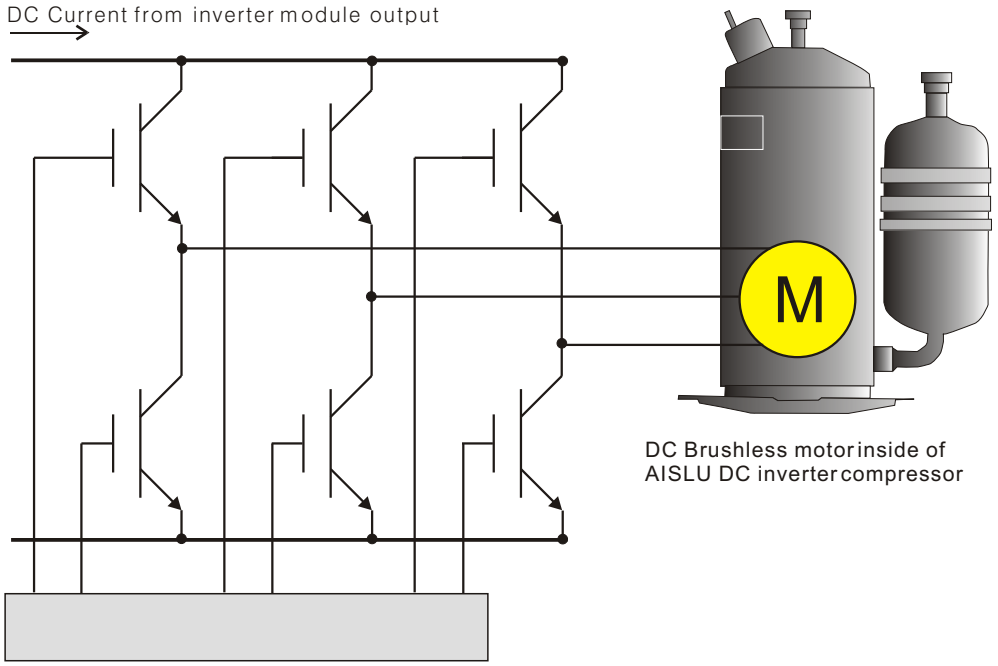
Features

- Sine wave DC inverter drive
- 3700W max output
- 18–120Hz Frequency
- Open interface

General Specifications

Rated AC input:	220–240V/50Hz
Nominal working voltage range:	AC 57V ~ 260V
Working voltage range base on AISLU system:	AC 114V ~ 230V
Working temperature range:	−15°C ~ 50°C
Inverter max. Output capacity::	3700W
Frequency Range:	18Hz ~ 120Hz
Cooling output range:	1260W ~ 3771W
Heating output range:	1230W ~ 5760W
COP tested base on AISLU system::	4.0W/W – 4.23 W/W @ 60Hz~75Hz

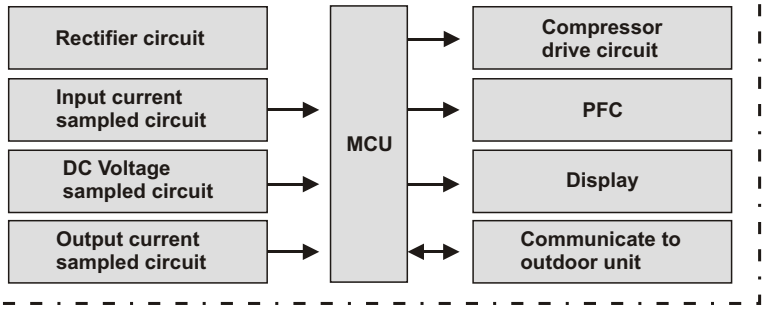
Compressor Drive Elements

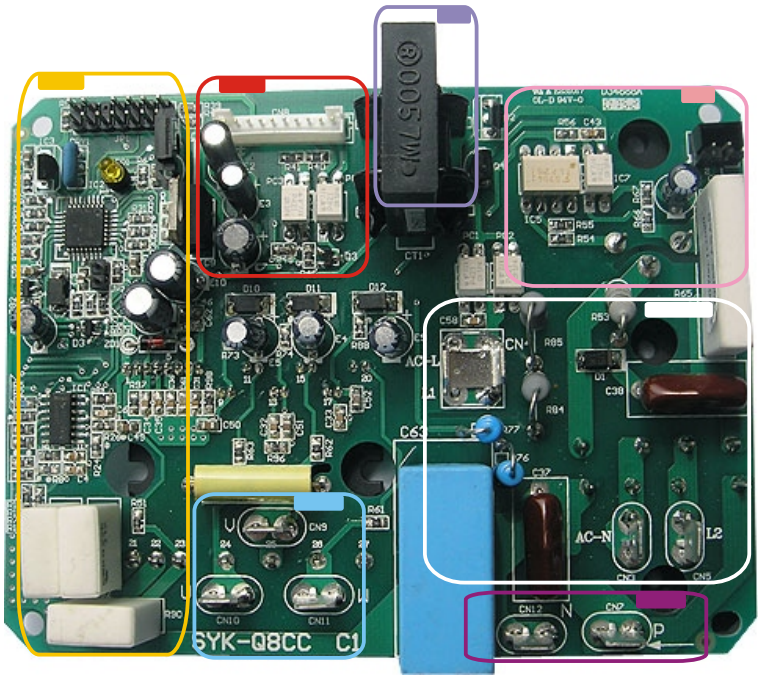


DC Brushless motor inside of
AISLU DC inverter compressor

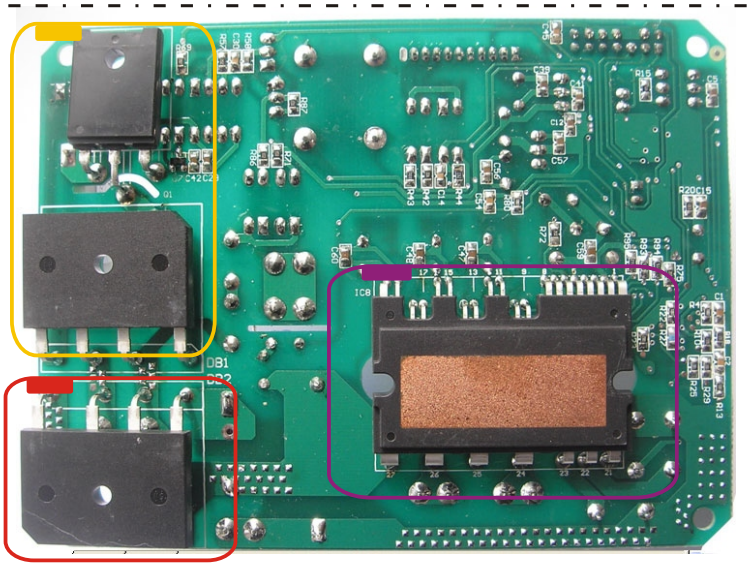
MK10423
DC Inverter Driver

Fabric & Components





- Compressor controls
- Control power input and UART
- Input current transformer
- PFC
- UVW connect compressor
- AC220-240V/50Hz connect to reactor
- Connect to electrolytic capacitor



- P PFC
- Rectifier
- Inverter Module

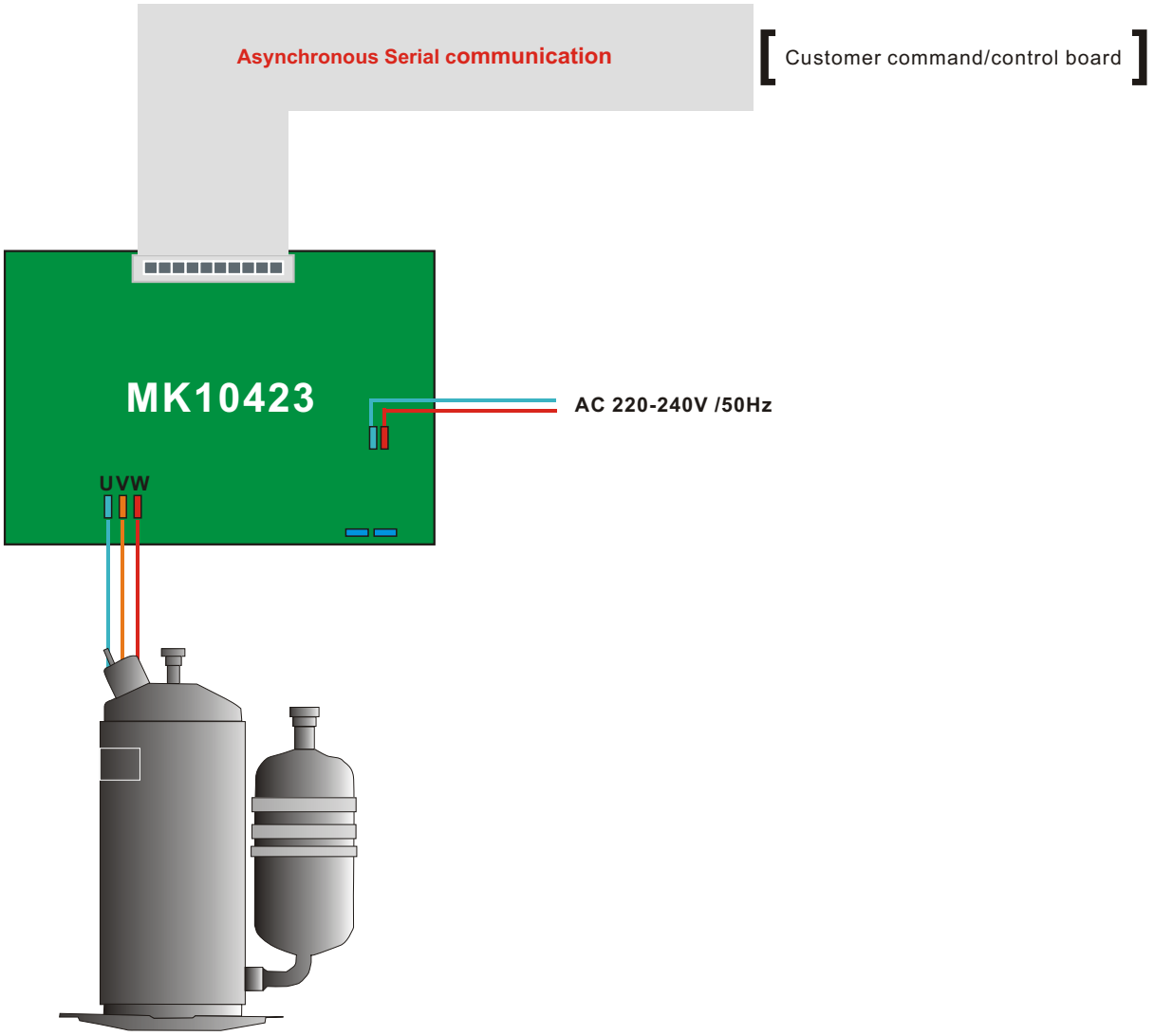
Configuration

Item	Function of board	Remark
Compressor driver unit	MCU output 6 drive signal to drive IPM, and IPM drive U/V/W 3phases compressor.	
PFC	Power factor correction	Part of PFC Connect exterior reactor
Input/Output	Input current sample	
	DC voltage sample	
	Compressor current sample	
	LED display: Display working state or fails	
Communication	Communicate with outdoor unit	
Other	Rectifier circuit, output pulse power source	

Functions

Item	Function of board	Remark
Compressor driver unit	Vector controls, Compressor drives, Permanent magnet compensates, Convulsion compensates	
PFC control unit	Power factor correction	Part buck-boost type
Protection	Overload protection (I/O over current protection)	
	Over voltage , undervoltage protection	
	IPM module protection	
	Compressor shock stall protection	
	PFC protection	
Communication	Asynchronous Serial communication, Communicate with command board. Command and data for frequency, current, voltage, compressor state and protection.	
Data collection	Collect input/output current, voltage (DC)	

Application



COMMUNICATION PROTOCOL

General

MK10423 includes ICU, OCU, CCU communications
ICU-OCU communications adopts current-loop half duplex master-slave asynchronous serial communications, ICU as master, OCU as slave; OCU-CCU adopts isolation master-slave asynchronous serial communications, OCU as master, CCU as slave.

Byte data regulations

1 Communication type: asynchronous serial communications
2 Baud rate: 600BPS
3 Start bit: 1BIT (low level)
4 Data bit: 8BIT
5 Parity check:even
6: Stop bit: 1BT (high level)

Data packet control protocol

0 Latency of each byte in sent data packet not exceed latency of a byte data length
1 Master originates communicating, slave wait and receive data packet sent from master
2 After master sent data packet, turn into receive waiting state immediately(latency not more than 10ms)
3 After slave received correct data packet, delay time 50ms send return data packet
4 After slave sent packet, turn into receive waiting state immediately(latency not more than 10ms)
5 After master receive correct data packet, delay time 50ms send return data packet

Error control

1 After master send data packet, has not receive correct slave data in 2sec, restart send data packet immediately

2 After slave received correct head code, must finish receiving within 1 secretary; restart receiving data packet if exceed 1sec

3 Slave receive data packet error, restart receiving data, not return signal to master

4 30sec after slave received master data packet and can not receive new data packet, as communication interrupted

5 40sec after master sent data packet and can not receive returned slave data packet, as communication interrupted

6 If master can control slave power supply, After communication interrupted, OFF power supply 2 minutes, eliminate faults and then restart power supply and continue communication

Data format

Master and slave data format are same, Frame format as head, address, type number, communicate data, CRC and frame end. The differentia is data content. Data packet data is 13 byte length.

Byte position	Data content	Note	Remark
0	Data packet(frame) head code	Changeless value, in the communication of ICU-OCU as : OAAH	
1	Data source address destination address	high-order position half-byte: data source add low-order position half-byte: destination add	One-one communication master: 0, slave:1
2	Data packet (frame) type, number	High-order position 3 byte as frame type low-order position 5 byte as frame number	Confirmed by frame type and protocol
3	Run data 0		Confirmed by product
4	Run data 1		Confirmed by product
5	Run data 2		Confirmed by product
6	Run data 3		Confirmed by product
7	Run data 4		Confirmed by product
8	Run data 5		Confirmed by product
9	Run data 6		Confirmed by product
10	Run data 7		Confirmed by product
11	Run data 8		Confirmed by product
12	Run data 9		Confirmed by product
13	Run data 10		Confirmed by product
14	Run data 11		Confirmed by product
15	Run data 12		Confirmed by product
16	Check sum	Check sum= (from 1st byte to 15th byte data accumulative total) ⊕ OFFH+1	Take a byte from total, strip high-order position
17	Data packet(frame) end code	Changeless value, in the communication of ICU-OCU as: 055H	Take a byte from total, strip high-order position

Data packet(Frame) type

* By application, the communications data as below:
  Run data: both sides of communications are accessed in natural corresponding and controls, the data or command transmitted in running

  Control parameter: control parameter for create natural run, normally transmitted before run

  Test data: The data or command transmitted for meet with diversified functions testing, performance testing or system maintenance or servicing

  Every data type can be 1 frame or multi-frame

* PRI and Quality of data:
  PRI: Control parameter > Test data > Run data ;
  Must meet control parameter at first if there is.
  Control parameter require data confirmation, Test data and Run data does not require.

* Setting method of data packet(frame) type:
  0 ICU-OCU communication, ICU as master, OCU as slave; OCU-CCU communications OCU as master, CCU as slave
  1 Normally, Master frame type PRI> slave frame type PRI, slave frame type is defined by master frame Type
  2 Slave in particular state, request high PRI data to obtain necessary data
  3 If slave requested data frame PRI same as master requested data frame in same PRI, then master first

4 Allow master setting Or read slave control parameter, slave Only read master control parameter.
(Use for test equipments)

* Data frame type and number
Each type of data frame has 256 number data frame, specific data frame obligated extend uses.
Data frame type number and data frame number definition as below:

Master send frame			
Frame type name	Frame type	Frame number	Function definition
Run data frame 1	0	0	Slave control parameter set by slave ROM table Send master run data command
Run data frame 2	1	0	Slave control parameter set by slave EEPROM table Send master run data command
Run data frame 3	2	0	Slave control parameter set by master communicate Send master run data command
Test data frame	3	0 –255	Set test data request request slave return test data
Control parameter frame	4	0 –255	Send frame number corresponding control parameter

Slave return frame			
Frame type name	Frame type number	Frame number	Function definition
Run data frame 1	0	0 – 255	Confirm received master run data and command return frame master type number and number requested data
Run data frame 2	1	0–255	Confirm received master run data and command return frame master type number and number requested data
Run data frame 3	2	0 –255	Confirm received master run data and command return frame master type number and number requested data
Test data frame	3	0 –255	Set test data request request transmitted out test data
Control parameter frame	4	0 –255	Send frame number corresponding control parameter

Communication data

OCU send CCU parameter

Command position	Parameter for transmitted to opposing party	Remark
The 0 byte	Identify code	0AAH
1_{st} byte	Communication source address	01H
2_{nd} byte	Data packet(frame) type, number	
3_{rd} byte	Compressor number	
4_{th} byte	Target of compressor frequency setting	
5_{th} byte	Stop current	
6_{th} byte	Reduce requency current	
7_{th} byte	Restore current	
8_{th} byte	Control state	
9_{th} byte	Obligated	
10_{th} byte	Obligated	
11_{th} byte	Obligated	
12_{th} byte	Obligated	
13_{th} byte	Obligated	
14_{th} byte	Obligated	
15_{th} byte	Obligated	
16_{th} byte	Check sum	
17_{th} byte	End Identify code	55H

3_{rd} byte: Compressor number:
0- 239: Compressor model number
240: be of no effect
241-255: Not setting model number, setting parameter by communication

4_{th} byte Target of compressor frequency setting
5_{th} byte Stop current
6_{th} byte Reduce requency current
7_{th} byte Restore current
8_{th} byte Control state

Content	Note	Note
Bit 0	Note	0:No 1:Yes
Bit 4	Warm-up control	0:No 1:Yes
Bit 5	PFC control	0:Yes 1:No

Communication data

OCU Receive CCU parameter

Command position	Parameter for transmitted to opposing party	Remark
The 0 byte	Identify code	0AAH
1_{st} byte	Communication source address	10H
2_{nd} byte	Data packet(frame) type, number	
3_{rd} byte	Compressor running frequency	
4_{th} byte	Input current	
5_{th} byte	DC Voltage	
6_{th} byte	CCU protection state	
7_{th} byte	Obligated	
8_{th} byte	Obligated	
9_{th} byte	Obligated	
10_{th} byte	Obligated	
11_{th} byte	Obligated	
12_{th} byte	Obligated	
13_{th} byte	Obligated	
14_{th} byte	Obligated	
15_{th} byte	Obligated	
16_{th} byte	Check sum	
17_{th} byte	End Identify code	55H

3_{rd} byte Compressor running frequency
4_{th} byte Input current = actual current * 10
5_{th} byte DC Voltage= actual voltage/2
6_{th} byte CCU protection state

Content	Note	Note
Bit 0	IPM protection	0:No 1:Yes
Bit 1	PFC protection	0:No 1:Yes
Bit 2	Compressor unconventionality	0:No 1:Yes
Bit 3	Over current protection	0:No 1:Yes
Bit 4	Voltage protection	0:No 1:Yes
Bit 5	Current transformer fault	0:No 1:Yes
Bit 6	Voltage transformer fault	0:No 1:Yes
Bit 7		