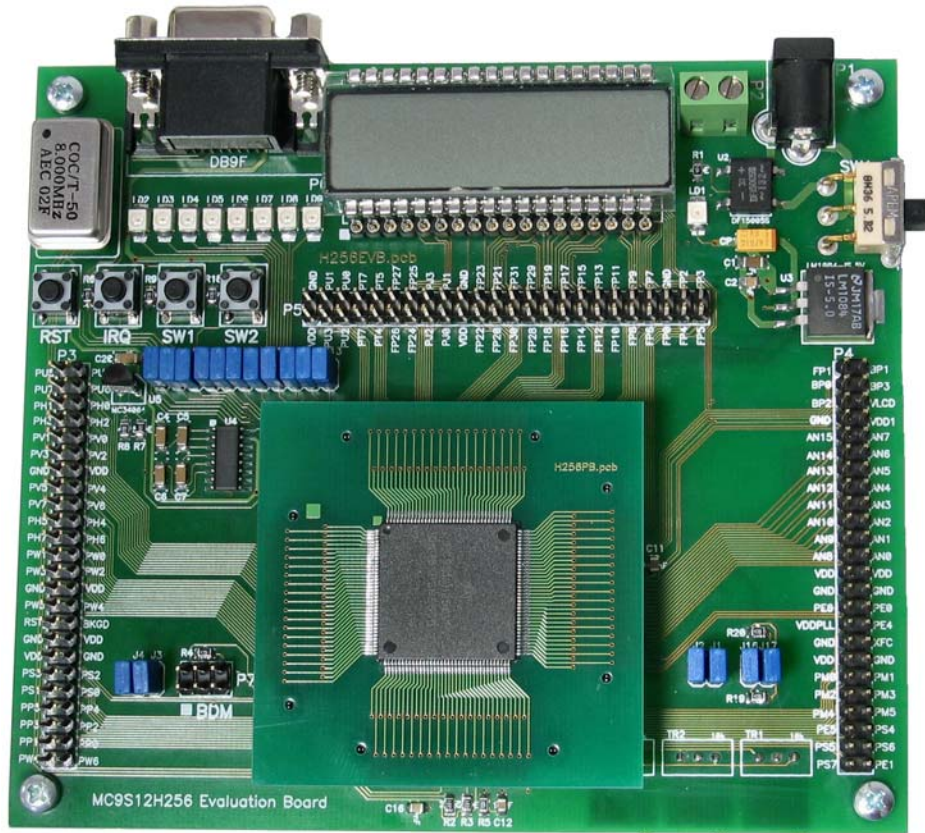


Motorola MC9S12H256 Evaluation Board

| | |
|---------------|--------------|
| Ordering code | ITMC9S12H256 |
|---------------|--------------|



MC9S12H256 Evaluation Board



MC9S12H256 CPU Piggyback

Features

The ITMC9S12H256 is an evaluation or development board for the Motorola MC9S12H256 microcontroller. iSYSTEM MC9S12H256 ActivePOD (in-circuit emulation) or HC(S)12 BDM debugger (on-chip emulation) can be connected to the board.

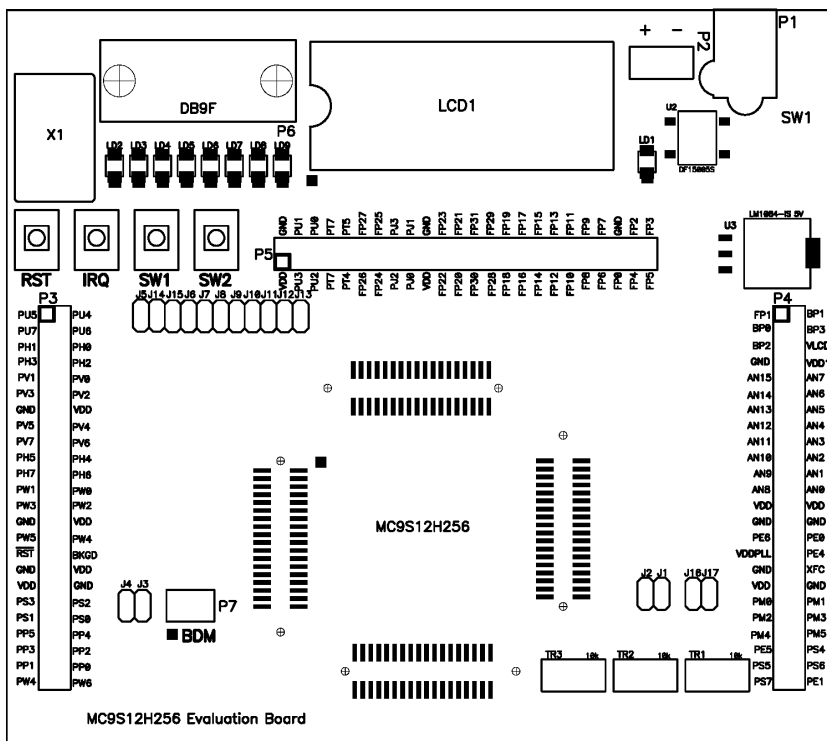
ActivePOD is connected directly to the board replacing the MC9S12H256 CPU piggyback. When BDM debugger is connected, MC9S12H256 CPU piggyback must be connected to the target and a standard BDM port is provided for the development tool.

Features

- MC9S12H256 CPU
- LCD display (16 segments x 8 characters)
- BDM debug connector
- RS232 port with DB9-F connector
- 8 MHz clock oscillator (16 MHz max)
- 3 expansion connectors
- Regulated 5 V power supply
- ON/OFF switch
- 3 + 1 push-buttons
- 8 + 1 LED indicators

Specifications

- Board size: 132.1 x 116.8 mm
- CPU piggyback size: 55.4 x 55.4 mm
- Power input 6 - 12 V DC, 9 V DC typical



Getting started

Setting up the board

The MC9S12H256 Evaluation board has been tested and programmed with the demo application. Please examine the board and check that:

- The LCD module and the crystal oscillator are installed.
- All jumpers (J1-J17) are set.

Standalone operation

- Make sure that the CPU piggyback is installed.
- Plug the DC source (e.g. AC wall adapter) to the P1 connector or apply DC source to the connector P2.
- Turn on the power switch SW1 and check the green power LED LD1.
- The board should execute a sample application.

Use with MC9S12H256 ActivePOD

- Remove the CPU piggyback from the board.
- Connect the MC9S12H256 ActivePOD to the board.
- Turn the emulator on and then power the target.
- Run winIDEA, open a sample project and carry out the debug reset. The system is ready for debugging.

Use with BDM debugger

- Make sure that the CPU piggyback is installed.
- Connect the 68HC(S)12 iCARD to a standard 6-pin BDM debug connector P7
- Turn the emulator on and then power the target.
- Run winIDEA, open a sample project and carry out the debug reset. The system is ready for debugging.

Running winIDEA

It's assumed that winIDEA is installed on a PC, where iSYSTEM development tool is connected.

Contact your local iSYSTEM sales representative for a sample project or download it from:

<ftp://www.asysselectronic.si/winidea/samples/targets/itmc9s12h256.zip>

Start winIDEA application from the Start menu and open a sample project workspace. If you are using ActivePOD, open sampleICE.jrf workspace and if you are using BDM debugger, open sampleBDM.jrf workspace. Next, check if proper emulator hardware is selected and the communication between the PC and the emulator.

Carry out the debug reset and run the application (debug run) in case of BDM debugger and carry out the debug download and run the application (debug run) in case of MC9S12H256 ActivePOD.

Blinking red LEDs (LD2-LD9) and a "Welcome" title on the LCD display indicate a working system. Additionally, a test string is sent to the host RS232 terminal.

There are four push buttons on the board designated SW1, SW2, RST and IRQ. RST resets the complete system. Make sure that 'Reset from target' option is checked in winIDEA when using RST button and the development system is connected to the board. IRQ turns on all LEDs. SW1 turns on one LED and shift its position to the left for each consecutive push. SW2 does the same except that it shifts in the opposite direction.

Trimmer TR1 controls the LCD brightness. Use a mini-screwdriver to adjust it.

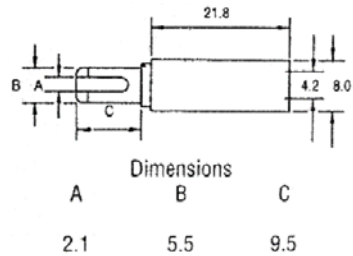
Trimmers TR2 and TR3 are connected to the CPU A/D converter. TR2 is connected to the channel 0 and TR3 to the channel 1. Refer to the board schematic for more details.

ITMC9S12H256 Operation

Power Supply

The external power supply must provide the voltage between 6 and 12 V DC (typical 9 V DC). Maximum current consumption shouldn't exceed 100 mA when 9 V DC is used. The polarity is not important. Low voltage DC plug must conform to the DIN 45323 standards:

- The hole diameter is 1.95 – 2.5 mm (standard: 2.1 mm)
- The external diameter is 6.2 - 5.5 mm (standard: 5.5 mm)



Note: The emulator must be powered on first, then the target board and vice versa when switching off the system. First, switch off the target and then the emulator.

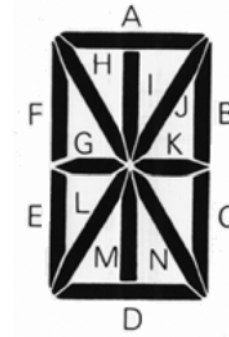
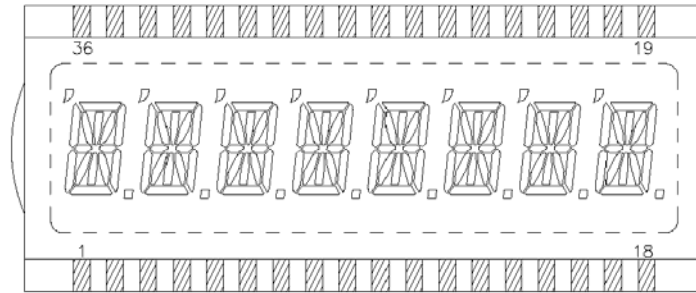
Jumpers

All CPU peripheral signals used on the board can be disconnected from the CPU via jumpers. By removing the jumper, the belonging signal is freed for the user. Note that all CPU signals are available on the expansion connectors and can be used by the user.

| Jumper | DESCRIPTION |
|--------|------------------------------|
| J1 | Enable AN0 (Analog input 0) |
| J2 | Enable AN1 (Analog input 1) |
| J3 | Enable PS1 (Transmit data) |
| J4 | Enable PS0 (Receive data) |
| J5 | Enable PE1 (IRQ push-button) |
| J6 | Enable PH0 (LD2) |
| J7 | Enable PH1 (LD3) |
| J8 | Enable PH2 (LD4) |
| J9 | Enable PH3 (LD5) |
| J10 | Enable PH4 (LD6) |
| J11 | Enable PH5 (LD7) |
| J12 | Enable PH6 (LD8) |
| J13 | Enable PH7 (LD9) |
| J14 | Enable PE0 (SW1 push-button) |
| J15 | Enable PM0 (SW2 push-button) |
| J16 | Enable PE6 (MODB=0) |
| J17 | Enable PE5 (MODA=0) |

LCD display

ITMC9S12H256 evaluation board uses 8-character LCD glass display. Each character consists of 14 segments. Following figures shows the segment position and a decoding table.



| PIN | COM1 | COM2 | COM3 | COM4 | PIN | COM1 | COM2 | COM3 | COM4 |
|-----|------|------|------|------|-----|------|------|------|------|
| 1 | 1D | 1E | 1F | 1S | 19 | NC | NC | COM3 | NC |
| 2 | 1J | 1I | 1H | 1G | 20 | NC | NC | NC | COM4 |
| 3 | 2D | 2E | 2F | 2S | 21 | 8DP | 8C | 8B | 8A |
| 4 | 2J | 2I | 2H | 2G | 22 | 8K | 8L | 8M | 8N |
| 5 | 3D | 3E | 3F | 3S | 23 | 7DP | 7C | 7B | 7A |
| 6 | 3J | 3I | 3H | 3G | 24 | 7K | 7L | 7M | 7N |
| 7 | 4D | 4E | 4F | 4S | 25 | 6DP | 6C | 6B | 6A |
| 8 | 4J | 4I | 4H | 4G | 26 | 6K | 6L | 6M | 6N |
| 9 | 5D | 5E | 5F | 5S | 27 | 5DP | 5C | 5B | 5A |
| 10 | 5J | 5I | 5H | 5G | 28 | 5K | 5L | 5M | 5N |
| 11 | 6D | 6E | 6F | 6S | 29 | 4DP | 4C | 4B | 4A |
| 12 | 6J | 6I | 6H | 6G | 30 | 4K | 4L | 4M | 4N |
| 13 | 7D | 7E | 7F | 7S | 31 | 3DP | 3C | 3B | 3A |
| 14 | 7J | 7I | 7H | 7G | 32 | 3K | 3L | 3M | 3N |
| 15 | 8D | 8E | 8F | 8S | 33 | 2DP | 2C | 2B | 2A |
| 16 | 8J | 8I | 8H | 8G | 34 | 2K | 2L | 2M | 2N |
| 17 | COM1 | NC | NC | NC | 35 | 1DP | 1C | 1B | 1A |
| 18 | NC | COM2 | NC | NC | 36 | 1K | 1L | 1M | 1N |

Decoding Table

Connectors

RS232 connector

| Pin | DESCRIPTION |
|-----|---------------------|
| P1 | N.C. |
| P2 | TxD (Transmit data) |
| P3 | RxD (Receive data) |
| P4 | N.C. |
| P5 | GND |
| P6 | N.C. |
| P7 | N.C. |
| P8 | N.C. |
| P9 | N.C. |

BDM debug connector

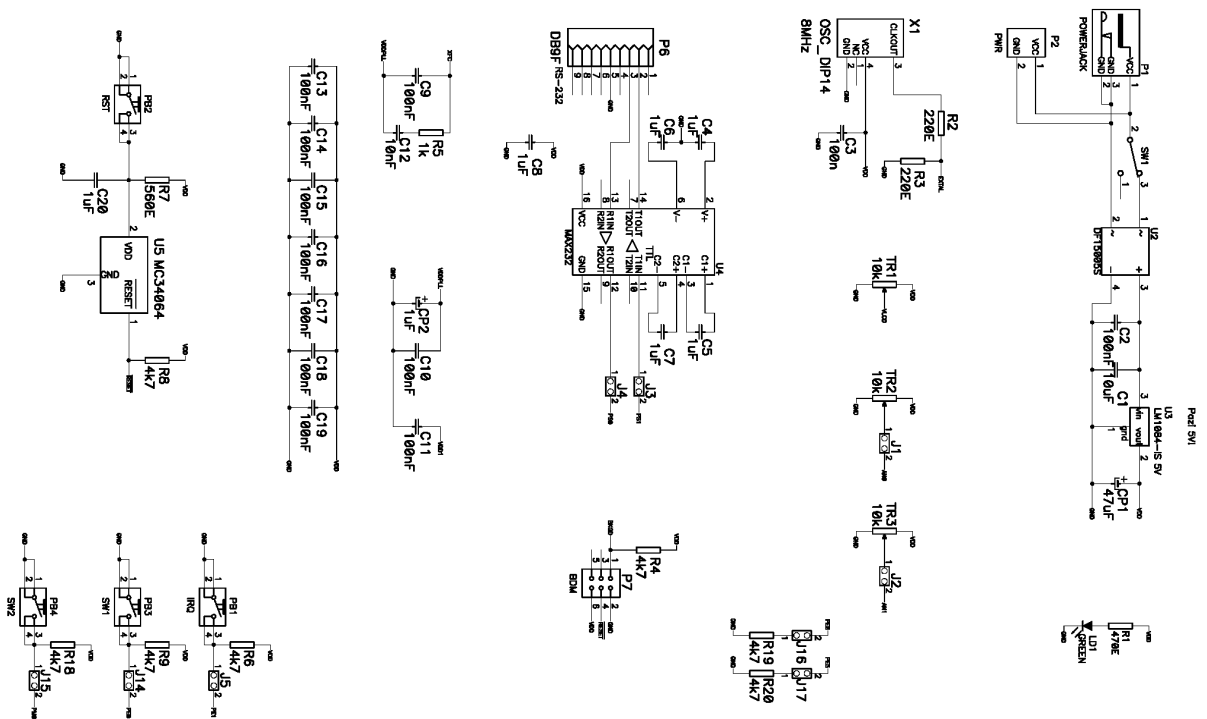
| | | | |
|------|---|---|------|
| BKGD | 1 | 2 | GND |
| N.C. | 3 | 4 | ~RST |
| N.C. | 5 | 6 | VDD |

Expansion connectors

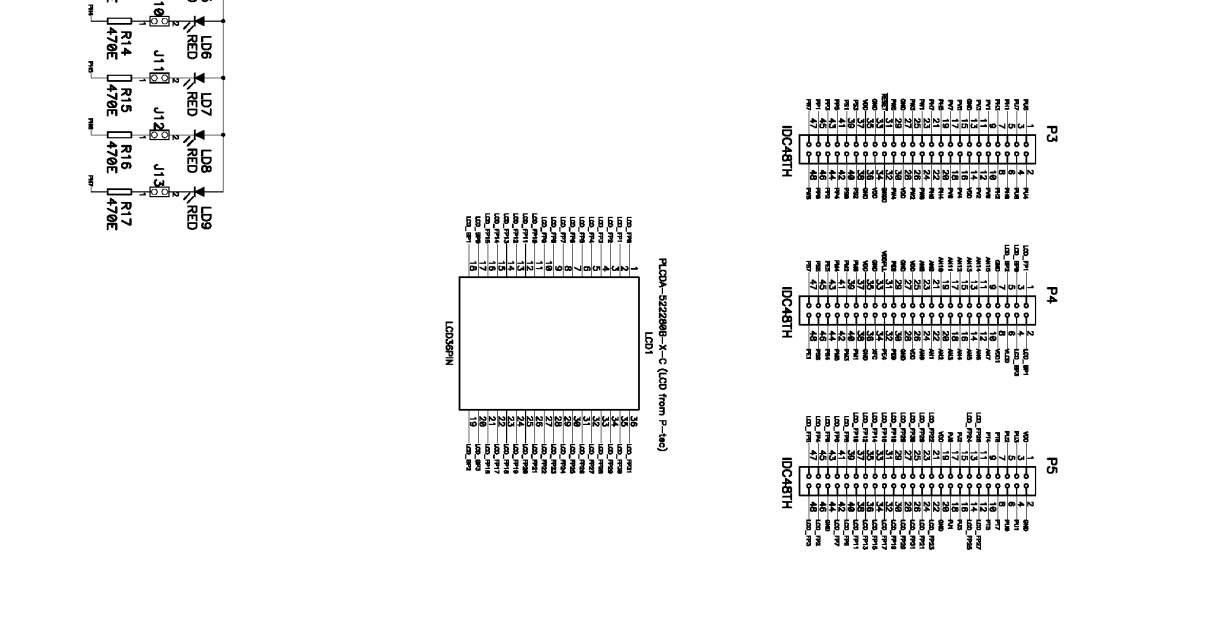
All CPU signals are present on the expansion connectors (P3, P4 and P5).

| | | | | | | | | | | | |
|-----------|----|----|-----------|--------|----|-----------|------|------|----|----|------|
| PU5 | 1 | 2 | PU4 | FP1 | 1 | 2 | BP1 | VDD | 1 | 2 | GND |
| PU7 | 3 | 4 | PU6 | BP0 | 3 | 4 | BP3 | PU3 | 3 | 4 | PU1 |
| PH1 | 5 | 6 | PH0 | BP2 | 5 | 6 | VLCD | PU2 | 5 | 6 | PU0 |
| PH3 | 7 | 8 | PH2 | GND | 7 | 8 | VDD1 | PT7 | 7 | 8 | PT7 |
| PV1 | 9 | 10 | PV0 | AN15 | 9 | 10 | AN7 | PT4 | 9 | 10 | PT5 |
| PV3 | 11 | 12 | PV2 | AN14 | 11 | 12 | AN6 | FP26 | 11 | 12 | FP27 |
| GND | 13 | 14 | VDD | AN13 | 13 | 14 | AN5 | FP24 | 13 | 14 | FP25 |
| PV5 | 15 | 16 | PV4 | AN12 | 15 | 16 | AN4 | PJ2 | 15 | 16 | PJ3 |
| PV7 | 17 | 18 | PV6 | AN11 | 17 | 18 | AN3 | PJ0 | 17 | 18 | PJ1 |
| PH5 | 19 | 20 | PH4 | AN10 | 19 | 20 | AN2 | VDD | 19 | 20 | GND |
| PH7 | 21 | 22 | PH6 | AN9 | 21 | 22 | AN1 | FP22 | 21 | 22 | FP23 |
| PW1 | 23 | 24 | PW0 | AN8 | 23 | 24 | AN0 | FP20 | 23 | 24 | FP21 |
| PW3 | 25 | 26 | PW2 | VDD | 25 | 26 | VDD | FP30 | 25 | 26 | FP31 |
| GND | 27 | 28 | VDD | GND | 27 | 28 | GND | FP28 | 27 | 28 | FP29 |
| PW5 | 29 | 30 | PW4 | PE6 | 29 | 30 | PE0 | FP18 | 29 | 30 | FP19 |
| ~RST | 31 | 32 | BKGD | VDDPLL | 31 | 32 | PE4 | FP16 | 31 | 32 | FP17 |
| GND | 33 | 34 | VDD | GND | 33 | 34 | XFC | FP14 | 33 | 34 | FP15 |
| VDD | 35 | 36 | GND | VDD | 35 | 36 | GND | FP12 | 35 | 36 | FP13 |
| PS3 | 37 | 38 | PS2 | PM0 | 37 | 38 | PM1 | FP10 | 37 | 38 | FP11 |
| PS1 | 39 | 40 | PS0 | PM2 | 39 | 40 | PM3 | FP8 | 39 | 40 | FP9 |
| PP5 | 41 | 42 | PP4 | PM4 | 41 | 42 | PM5 | FP6 | 41 | 42 | FP7 |
| PP3 | 43 | 44 | PP2 | PE5 | 43 | 44 | PS4 | FP0 | 43 | 44 | GND |
| PP1 | 45 | 46 | PP0 | PS5 | 45 | 46 | PS6 | FP4 | 45 | 46 | FP2 |
| PW4 | 47 | 48 | PW6 | PS7 | 47 | 48 | PE1 | FP5 | 47 | 48 | FP3 |
| P3 | | | P4 | | | P5 | | | | | |

Schematic



| U1 | TEST | 50 | 50A |
|------|-------|----|-----|
| U1 | MC339 | 50 | 50A |
| U2 | MC339 | 50 | 50A |
| U3 | MC339 | 50 | 50A |
| U4 | MC339 | 50 | 50A |
| U5 | MC339 | 50 | 50A |
| U6 | MC339 | 50 | 50A |
| U7 | MC339 | 50 | 50A |
| U8 | MC339 | 50 | 50A |
| U9 | MC339 | 50 | 50A |
| U10 | MC339 | 50 | 50A |
| U11 | MC339 | 50 | 50A |
| U12 | MC339 | 50 | 50A |
| U13 | MC339 | 50 | 50A |
| U14 | MC339 | 50 | 50A |
| U15 | MC339 | 50 | 50A |
| U16 | MC339 | 50 | 50A |
| U17 | MC339 | 50 | 50A |
| U18 | MC339 | 50 | 50A |
| U19 | MC339 | 50 | 50A |
| U20 | MC339 | 50 | 50A |
| U21 | MC339 | 50 | 50A |
| U22 | MC339 | 50 | 50A |
| U23 | MC339 | 50 | 50A |
| U24 | MC339 | 50 | 50A |
| U25 | MC339 | 50 | 50A |
| U26 | MC339 | 50 | 50A |
| U27 | MC339 | 50 | 50A |
| U28 | MC339 | 50 | 50A |
| U29 | MC339 | 50 | 50A |
| U30 | MC339 | 50 | 50A |
| U31 | MC339 | 50 | 50A |
| U32 | MC339 | 50 | 50A |
| U33 | MC339 | 50 | 50A |
| U34 | MC339 | 50 | 50A |
| U35 | MC339 | 50 | 50A |
| U36 | MC339 | 50 | 50A |
| U37 | MC339 | 50 | 50A |
| U38 | MC339 | 50 | 50A |
| U39 | MC339 | 50 | 50A |
| U40 | MC339 | 50 | 50A |
| U41 | MC339 | 50 | 50A |
| U42 | MC339 | 50 | 50A |
| U43 | MC339 | 50 | 50A |
| U44 | MC339 | 50 | 50A |
| U45 | MC339 | 50 | 50A |
| U46 | MC339 | 50 | 50A |
| U47 | MC339 | 50 | 50A |
| U48 | MC339 | 50 | 50A |
| U49 | MC339 | 50 | 50A |
| U50 | MC339 | 50 | 50A |
| U51 | MC339 | 50 | 50A |
| U52 | MC339 | 50 | 50A |
| U53 | MC339 | 50 | 50A |
| U54 | MC339 | 50 | 50A |
| U55 | MC339 | 50 | 50A |
| U56 | MC339 | 50 | 50A |
| U57 | MC339 | 50 | 50A |
| U58 | MC339 | 50 | 50A |
| U59 | MC339 | 50 | 50A |
| U60 | MC339 | 50 | 50A |
| U61 | MC339 | 50 | 50A |
| U62 | MC339 | 50 | 50A |
| U63 | MC339 | 50 | 50A |
| U64 | MC339 | 50 | 50A |
| U65 | MC339 | 50 | 50A |
| U66 | MC339 | 50 | 50A |
| U67 | MC339 | 50 | 50A |
| U68 | MC339 | 50 | 50A |
| U69 | MC339 | 50 | 50A |
| U70 | MC339 | 50 | 50A |
| U71 | MC339 | 50 | 50A |
| U72 | MC339 | 50 | 50A |
| U73 | MC339 | 50 | 50A |
| U74 | MC339 | 50 | 50A |
| U75 | MC339 | 50 | 50A |
| U76 | MC339 | 50 | 50A |
| U77 | MC339 | 50 | 50A |
| U78 | MC339 | 50 | 50A |
| U79 | MC339 | 50 | 50A |
| U80 | MC339 | 50 | 50A |
| U81 | MC339 | 50 | 50A |
| U82 | MC339 | 50 | 50A |
| U83 | MC339 | 50 | 50A |
| U84 | MC339 | 50 | 50A |
| U85 | MC339 | 50 | 50A |
| U86 | MC339 | 50 | 50A |
| U87 | MC339 | 50 | 50A |
| U88 | MC339 | 50 | 50A |
| U89 | MC339 | 50 | 50A |
| U90 | MC339 | 50 | 50A |
| U91 | MC339 | 50 | 50A |
| U92 | MC339 | 50 | 50A |
| U93 | MC339 | 50 | 50A |
| U94 | MC339 | 50 | 50A |
| U95 | MC339 | 50 | 50A |
| U96 | MC339 | 50 | 50A |
| U97 | MC339 | 50 | 50A |
| U98 | MC339 | 50 | 50A |
| U99 | MC339 | 50 | 50A |
| U100 | MC339 | 50 | 50A |



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