



# XTM5808

## Multi-Channel Motor Driver

**XTX Technology Inc.**

Tel: (+86 755) 28229862

Fax: (+86 755) 28229847

Web Site: <http://www.txttech.com/>

Technical Contact: [fae@txttech.com](mailto:fae@txttech.com)

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## GENERAL DESCRIPTION

XTM5808 is a fully integrated drive solution specifically for stepping motor, DC brush motor, relays, solenoid valve or other motion control applications. This device can control the eight-channel low-side NMOS drive array and the one-channel H-bridge drive circuit through the four-channel input signals.

XTM5808 support the maximum operating voltage of 18V, the internal eight-channel NMOS drive array is independent of each other, with a single NMOS drive current of 500 mA; the peak output current of H bridge drive circuit can reach 800 mA. At the same time, it integrates over temperature protection, under voltage lock and other protection functions.

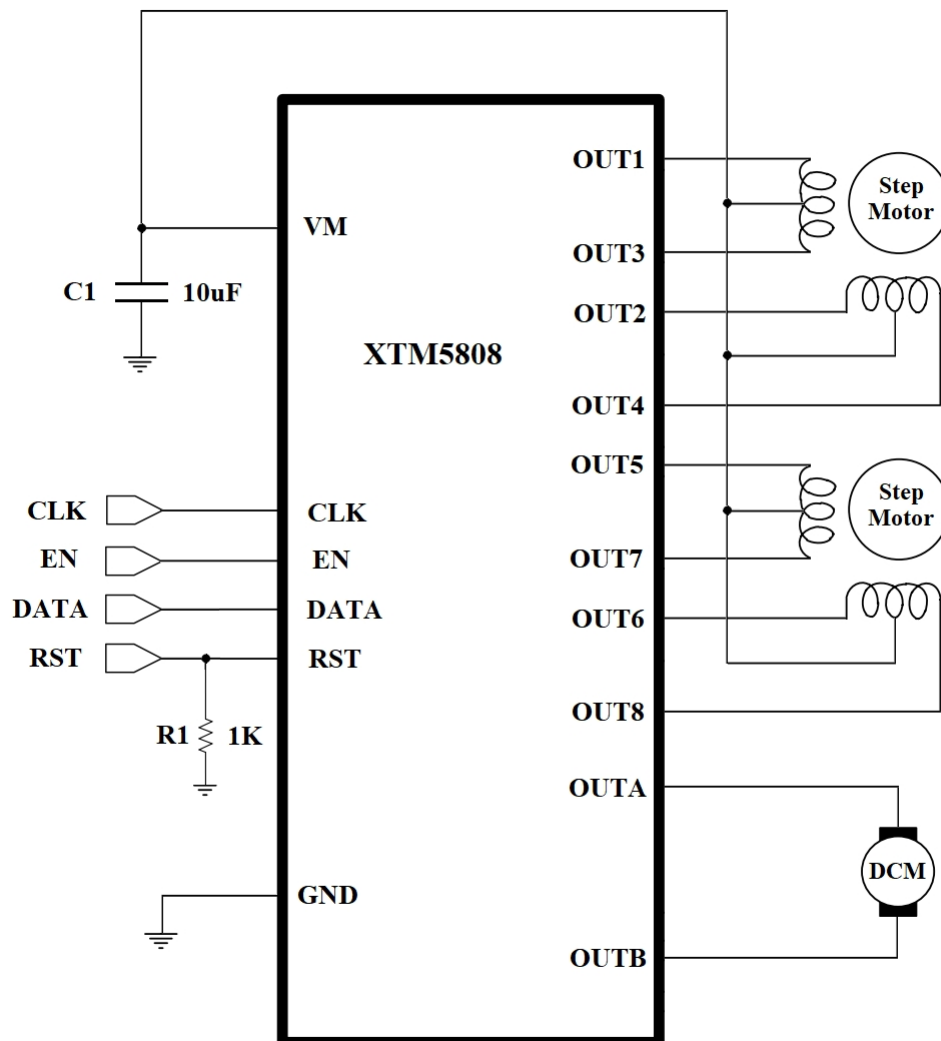
## FEATURES

- Range of operating voltage: 2.7V-18V
- The NMOS driver arrays
  - Drive relay and stepping motor
  - Single-channel continuous output current of 500 mA
  - Internal integrated freewheeling diode
- H Bridge drive circuit
  - Drive a DC motor
  - Drive the IR-CUT circuit
  - Output load current for 500 mA
  - Internal resistance of power-mosfet 1.7  $\Omega$  (VM = 12 V)
- Support for 1.8V~5V logical input
- Package: SOP16, QFN 4\*4-16L

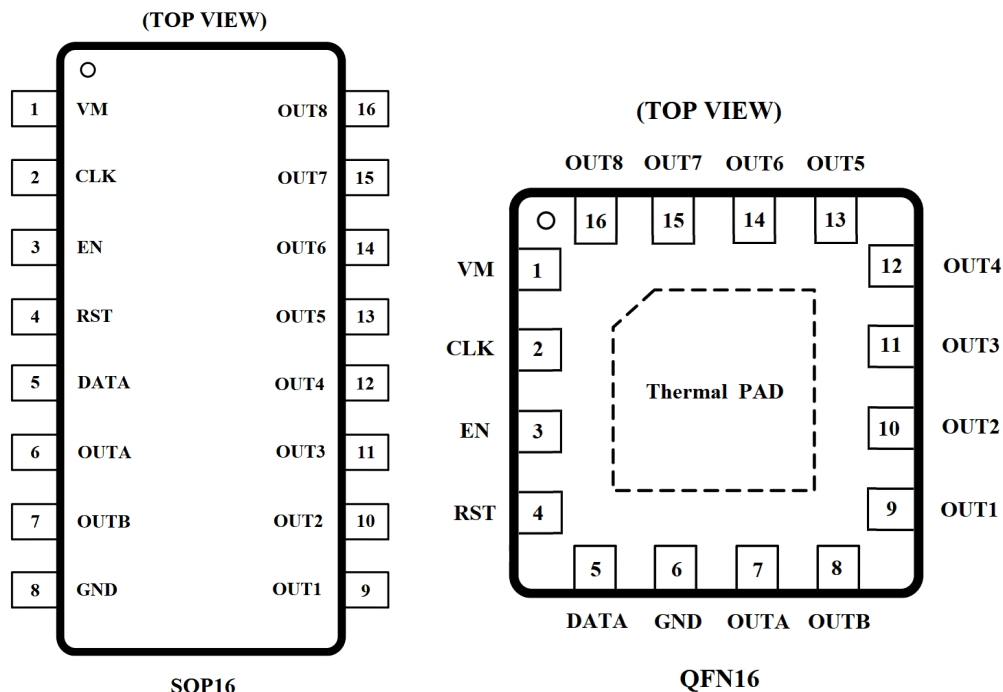
## APPLICATIONS

- Step Motor Drive
- Security Surveillance Camera
- Home Appliance

## TYPICAL APPLICATION



## PIN CONFIGURATIONS



| NAME        | SOP16 | QFN16 | TYPE | DESCRIPTION                                     |
|-------------|-------|-------|------|-------------------------------------------------|
| VM          | 1     | 1     | P    | Power supply                                    |
| CLK         | 2     | 2     | I    | Clock input                                     |
| EN          | 3     | 3     | I    | Data output is enabled, and is highly efficient |
| RST         | 4     | 4     | I    | Reset pin, high effective                       |
| DATA        | 5     | 5     | I    | Data-in                                         |
| OUTA        | 6     | 7     | O    | H bridge A output, same as data D8              |
| OUTB        | 7     | 8     | O    | H bridge B output, same as data D9              |
| GND         | 8     | 6     | G    | GND                                             |
| OUT1        | 9     | 9     | O    | 1 Channel output, as opposite to data D0        |
| OUT2        | 10    | 10    | O    | 2 Channel output, as opposite to data D1        |
| OUT3        | 11    | 11    | O    | 3 Channel output, as opposite to data D2        |
| OUT4        | 12    | 12    | O    | 4 Channel output, as opposite to data D3        |
| OUT5        | 13    | 13    | O    | 5 Channel output, as opposite to data D4        |
| OUT6        | 14    | 14    | O    | 6 Channel output, as opposite to data D5        |
| OUT7        | 15    | 15    | O    | 7 Channel output, as opposite to data D6        |
| OUT8        | 16    | 16    | O    | 8 Channel output, as opposite to data D7        |
| Thermal PAD | -     | -     | G    | GND                                             |

## PACKAGE/ORDERING INFORMATION

| Part Number  | Package    | Qty/TR | Operating Temperature Range |
|--------------|------------|--------|-----------------------------|
| XTM5808AS9CT | SOP16      | 4000   | -40°C~85°C                  |
| XTM5808AQ6CT | QFN4*4-16L | 3000   | -40°C~85°C                  |

## ABSOLUTE MAXIMUM RATINGS

| Parameter                        |                                      | Min  | Max  | Unit |
|----------------------------------|--------------------------------------|------|------|------|
| Power Supply                     | $V_M$                                | -0.3 | 20.0 | V    |
| Input Logic Voltage              | $V_{CLK}, V_{EN}, V_{DATA}, V_{RST}$ | -0.3 | 5.5  | V    |
| Output Voltage                   | $V_{OUT}$                            | -0.3 | 20.0 | V    |
| ESD (HBM)                        | ESD                                  | 4000 | -    | V    |
| Operating Temperature            | $T_{OPR}$                            | -40  | 85   | °C   |
| Storage Temperature              | $T_{stg}$                            | -65  | 150  | °C   |
| Junction Temperature             | $T_j$                                | -    | 150  | °C   |
| Lead Temperature (Soldering 10s) |                                      | -    | 260  | °C   |

## RECOMMENDED OPERATING CONDITIONS (Unless otherwise noted, $T_a=25^{\circ}\text{C}$ )

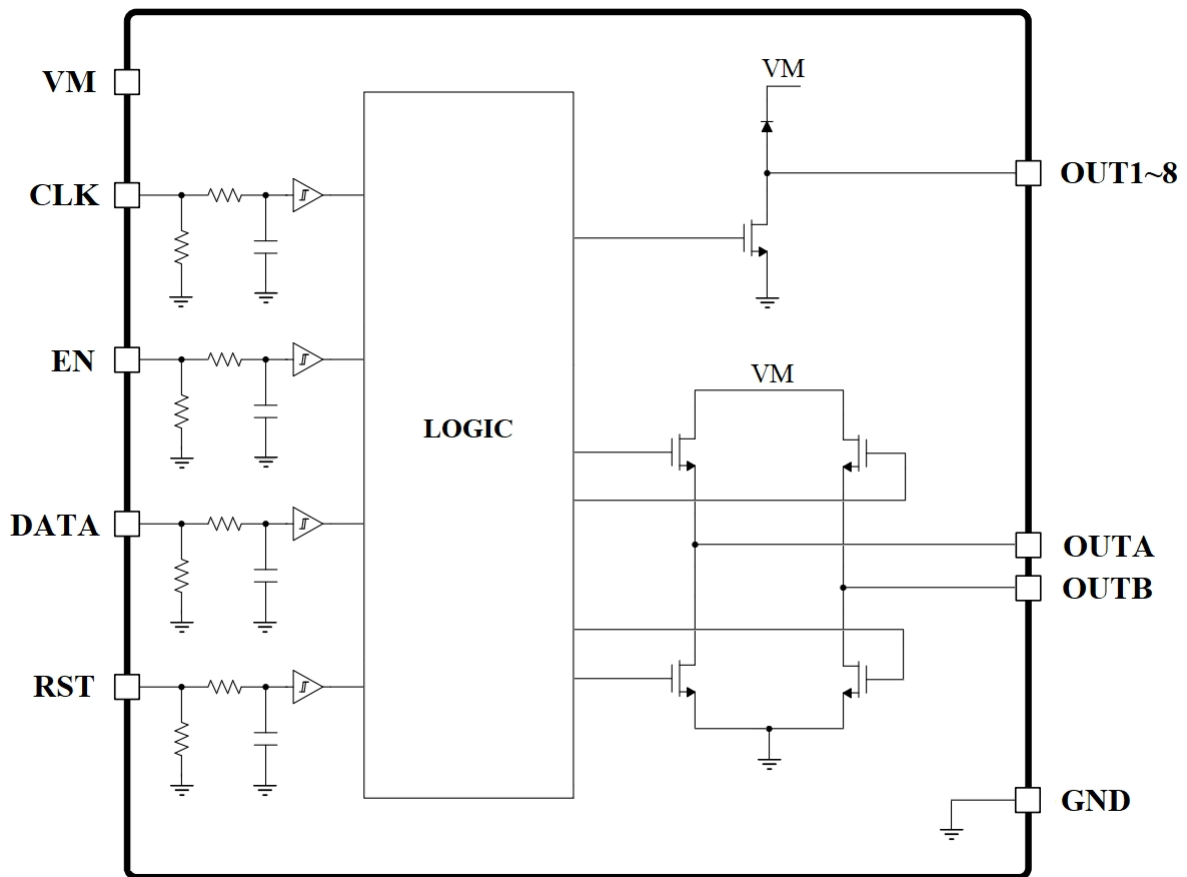
| Parameter                     |                                      | Min | Max | Unit |
|-------------------------------|--------------------------------------|-----|-----|------|
| Power Supply                  | $V_M$                                | 2.7 | 18  | V    |
| Input Logic Voltage           | $V_{CLK}, V_{EN}, V_{DATA}, V_{RST}$ | 0   | 5   | V    |
| Output Current (continuously) | $I_{OUT}$                            | 0   | 0.5 | A    |

## ELECTRICAL CHARACTERISTICS

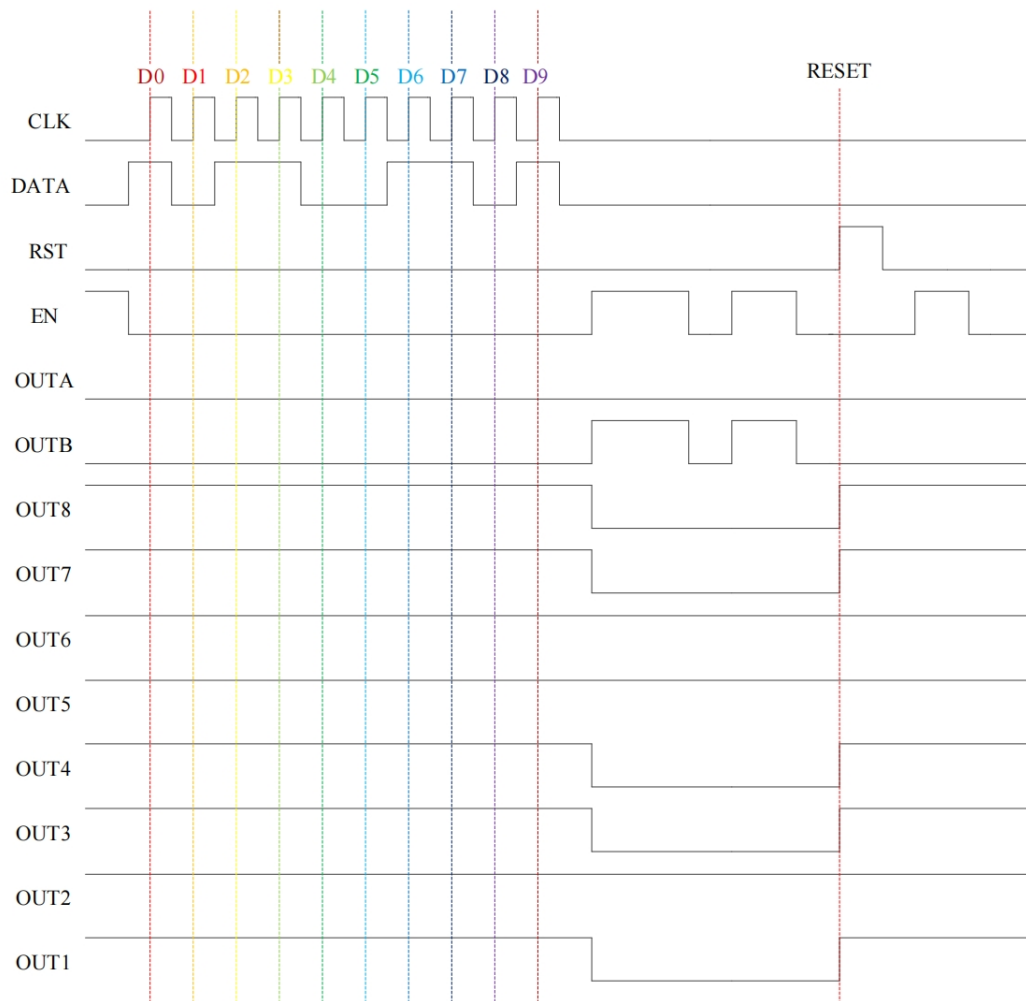
Unless otherwise noted,  $V_M=12V$ ,  $T_a=25^{\circ}C$

| Symbol                     | Parameter                                   | Test Conditions                      | Min | Typ  | Max | Unit        |
|----------------------------|---------------------------------------------|--------------------------------------|-----|------|-----|-------------|
| <b>POWER SUPPLY</b>        |                                             |                                      |     |      |     |             |
| $V_M$                      | Power Supply Voltage                        |                                      | 2.7 | -    | 18  | V           |
| $I_{MQ}$                   | Standby Current                             | $V_{RST}=H$ , no load,               | -   | -    | 5   | $\mu A$     |
| $I_M$                      | Operating Current                           |                                      | -   | 200  | 500 | $\mu A$     |
| <b>INPUT LOGIC</b>         |                                             |                                      |     |      |     |             |
| $V_{INH}$                  | Input High Voltage                          |                                      | 1.5 | -    | 5   | V           |
| $V_{INL}$                  | Input Low Voltage                           |                                      | -   | -    | 0.4 | V           |
| $I_{INH}$                  | Input High Current                          | $V_{CLK}=V_{DATA}=V_{EN}=V_{RST}=5V$ | -   | 5    | 10  | $\mu A$     |
| $I_{INL}$                  | Input Low Current                           | $V_{CLK}=V_{DATA}=V_{EN}=V_{RST}=0V$ | -   | -    | 1   | $\mu A$     |
| $F_{CLK}$                  | CLK Frequency                               |                                      | -   | -    | 1   | MHz         |
| <b>PROTECTION CIRCUITS</b> |                                             |                                      |     |      |     |             |
| $T_{TSD}$                  | Thermal shutdown temperature                |                                      | -   | 165  | -   | $^{\circ}C$ |
| $T_{TSDHYS}$               | Thermal shutdown hysteresis                 |                                      | -   | 25   | -   | $^{\circ}C$ |
| $V_{UVLO}$                 | VM supply under-voltage lockout             |                                      | -   | 2.35 | -   | V           |
| <b>Power MOSFETs</b>       |                                             |                                      |     |      |     |             |
| $R_{DS(ON)}$               | HS+LS FETs on-resistance (H-Bridge)         | $I_{LOAD}=100mA$ , HS+LS             | -   | 1.7  | -   | $\Omega$    |
|                            | Low-side NMOS driver resistance (OUT1-OUT8) | $I_{OUT}=300mA$                      | -   | 1.3  | -   | $\Omega$    |
| $V_{FWD}$                  | Clamp Forward Voltage                       | $I_F=350mA$                          | -   | 1.05 | 1.3 | V           |

## BLOCK DIAGRAM

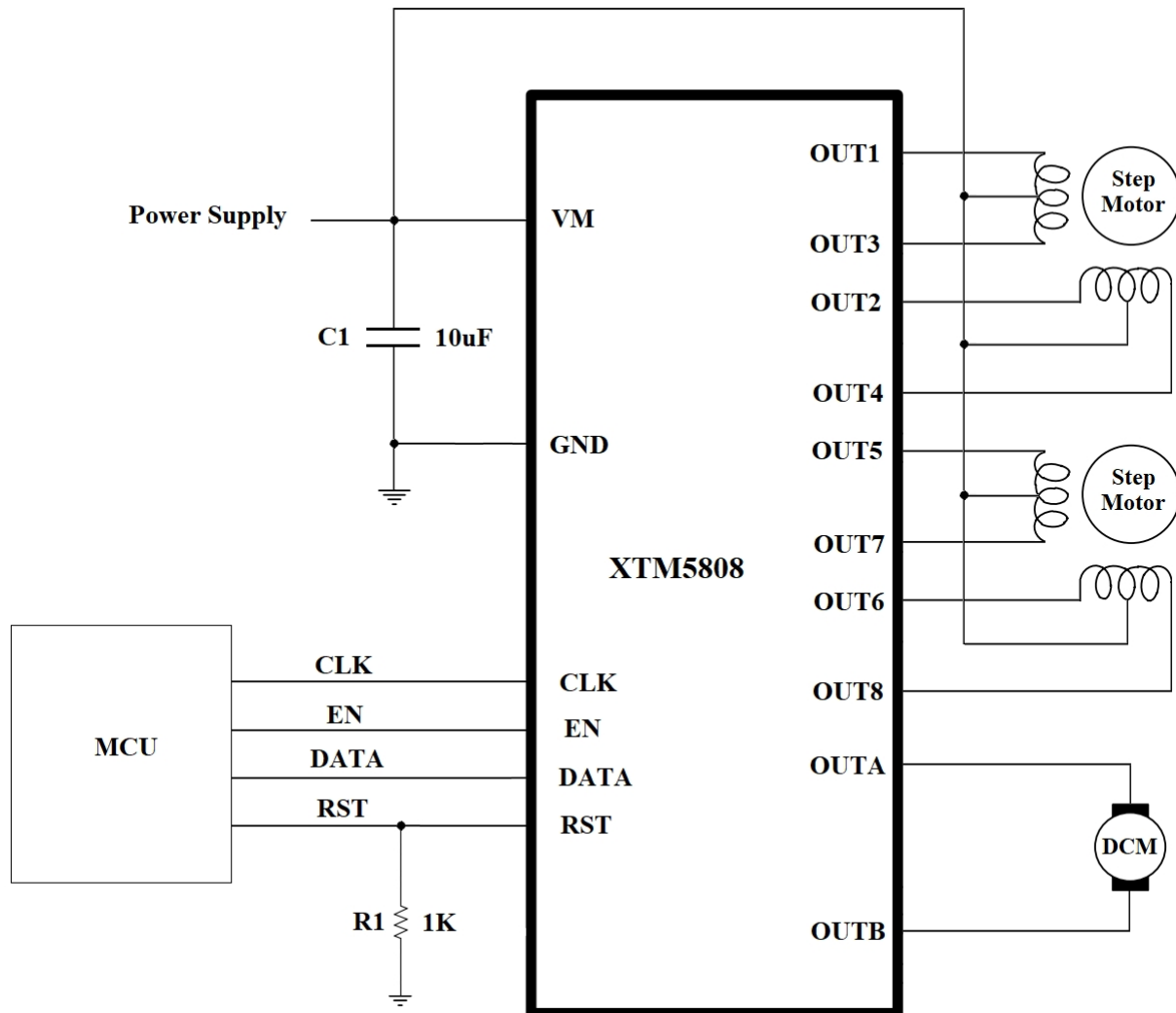


## INPUT AND OUTPUT TIMING DIAGRAM



- 1、CLK is the input clock signal, and the highest clock frequency should be less than 1 MHz;
- 2、EN performs data latch for low level, EN performs latch data output for high level, and control the status of OUT1 ~ OUT8, OUTA and OUTB;
- 3、The RST is the reset PIN, and the high level is reset. The pin can be floating or grounded without the RST function;
- 4、Output data: Output OUT1 to OUT8 as opposite to the data D0 to D7. The data bits corresponding to the output OUTA and OUTB are D8 and D9, and the pulse width of OUTA and OUTB output pulse is determined by the EN pulse width;
- 5、Since OUT1 to OUT8 are the open drain output, OUT1-OUT8 are the waveform when the external pull resistance is connected to the power supply. When OUT1 ~ OUT8 is for low level, the power tube is turned on, and for high level, the power tube is turned off.

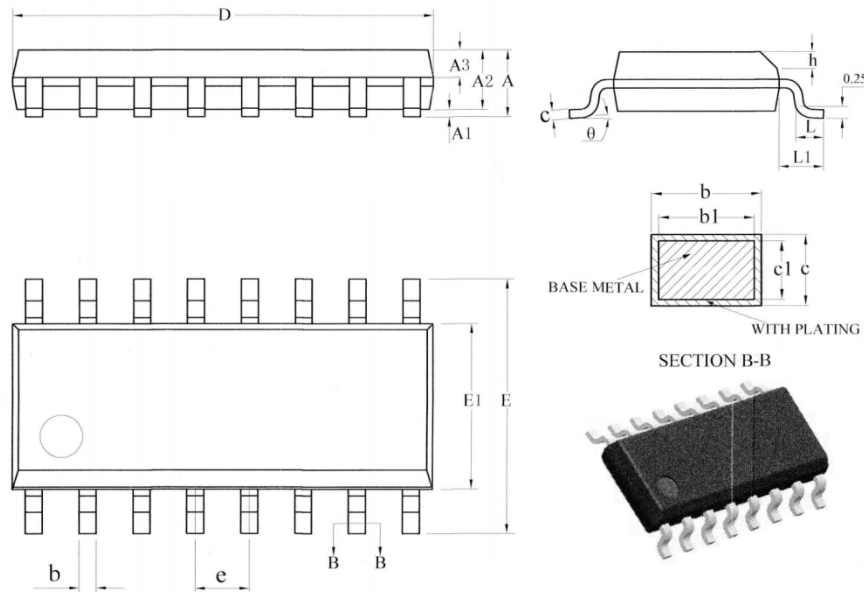
## APPLICATION CIRCUIT



- 1、The absolute parameters of the chip cannot be exceeded in any environment
- 2、Do not directly short-connect the two outputs of the H bridge or the power supply. The peak current caused by this situation will burn down the IC
- 3、If the motor exceeds the peak current of the IC design when blocking the rotation, it will also cause IC damage
- 4、The bypass capacitor 10uF of the VM shall be as close to the chip VM pin as possible
- 5、The ground wire connecting the motor needs to be isolated in the layout
- 6、Strictly control the maximum continuous output current of OUT1 ~ OUT8 and OUTA, OUTB to avoid damage to the chip due to overheating
- 7、To prevent triggering reset errors, RST externally adds 1K pull-down resistance

## PACKAGE INFORMATION

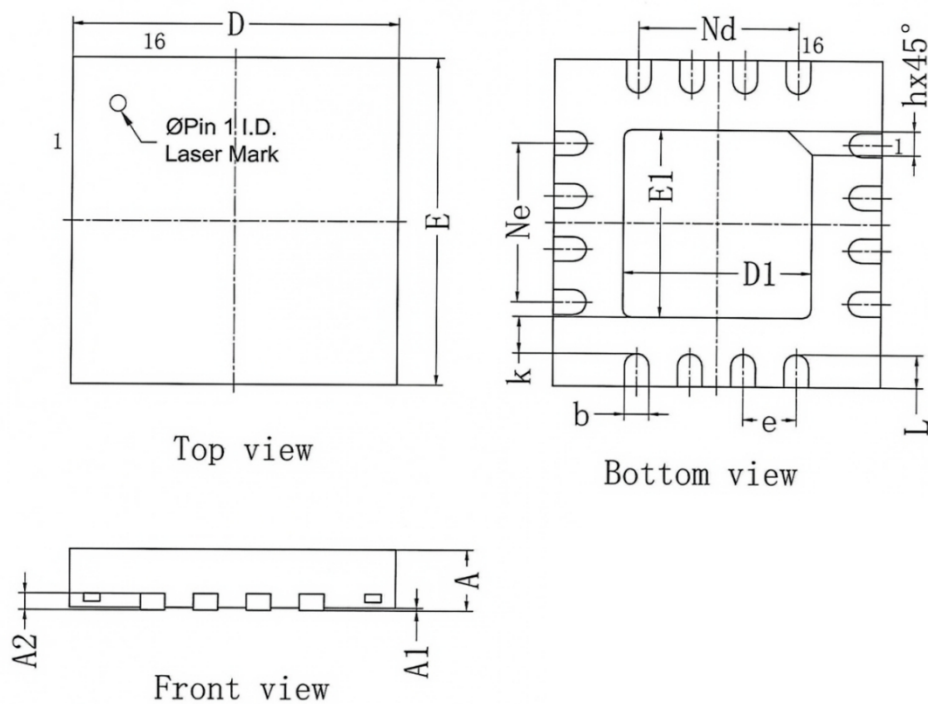
### SOP16



| Symbol | Dimensions In Millimeters |      |       |
|--------|---------------------------|------|-------|
|        | Min                       | Nom  | Max   |
| A      | -                         | -    | 1.75  |
| A1     | 0.10                      | -    | 0.225 |
| A2     | 1.30                      | 1.40 | 1.50  |
| A3     | 0.60                      | 0.65 | 0.70  |
| b      | 0.39                      | -    | 0.47  |
| b1     | 0.38                      | 0.41 | 0.44  |
| c      | 0.20                      | -    | 0.24  |
| c1     | 0.19                      | 0.20 | 0.21  |
| D      | 9.80                      | 9.90 | 10.00 |
| E      | 5.80                      | 6.00 | 6.20  |
| E1     | 3.80                      | 3.90 | 4.00  |
| e      | 1.27BSC                   |      |       |
| h      | 0.25                      | -    | 0.50  |
| L      | 0.50                      | -    | 0.80  |
| L1     | 1.05REF                   |      |       |
| θ      | 0                         | -    | 8°    |

## PACKAGE INFORMATION

### QFN16L-4\*4



| Symbol | Dimensions In Millimeters |      |      |
|--------|---------------------------|------|------|
|        | Min                       | Nom  | Max  |
| A      | 0.70                      | 0.75 | 0.80 |
| A1     | 0.00                      | -    | 0.05 |
| A2     | 0.203REF                  |      |      |
| b      | 0.25                      | 0.30 | 0.35 |
| D      | 3.90                      | 4.00 | 4.10 |
| D1     | 2.20                      | 2.30 | 2.40 |
| E      | 3.90                      | 4.00 | 4.10 |
| E1     | 2.20                      | 2.30 | 2.40 |
| e      | 0.65BSC                   |      |      |
| Nd     | 1.95BSC                   |      |      |
| Ne     | 1.95BSC                   |      |      |
| h      | 0.30REF                   |      |      |
| k      | 0.20                      | -    | -    |
| L      | 0.30                      | 0.40 | 0.50 |

## REVISION HISTORY

| Number  | Description                           |
|---------|---------------------------------------|
| Rev 0.0 | XTM5808 datasheet release             |
| Rev 0.1 | Update the PIN description            |
| Rev 0.2 | Update the ELECTRICAL CHARACTERISTICS |
| Rev 0.3 | Update the APPLICATION CIRRCUIT       |