

**TOSHIBA**

**MP4410**

TOSHIBA POWER MOS FET MODULE SILICON N CHANNEL MOS TYPE (L<sup>2</sup>-π-MOSV 4 IN 1)

# MP4410

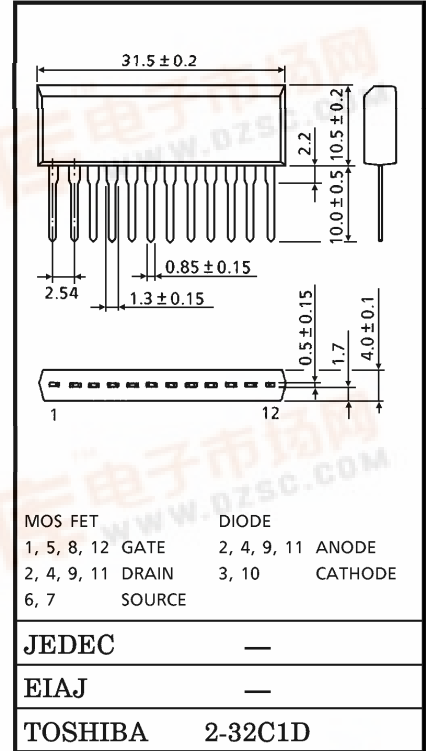
HIGH POWER, HIGH SPEED SWITCHING APPLICATIONS

HAMMER DRIVE, PULSE MOTOR DRIVE AND INDUCTIVE LOAD SWITCHING

INDUSTRIAL APPLICATIONS

Unit in mm

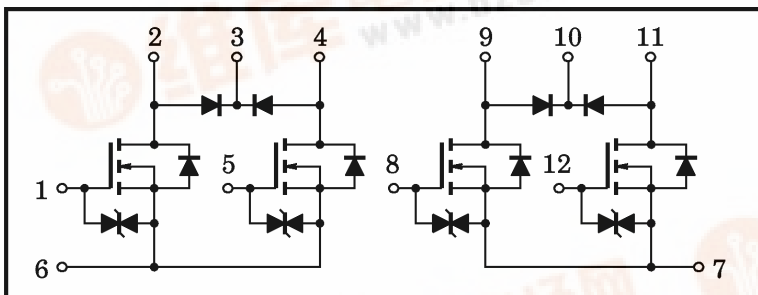
- 4-Volt Gate Drive Available
- Small Package by Full Molding (SIP 12 Pin)
- High Drain Power Dissipation (4 Devices Operation)  
: P<sub>T</sub>=28W (T<sub>c</sub>=25°C)
- Low Drain-Source ON Resistance : R<sub>DS (ON)</sub>=0.12Ω (Typ.)
- Low Leakage Current : I<sub>GSS</sub>=±10μA (Max.) (V<sub>GS</sub>=±16V)  
I<sub>DSS</sub>=100μA (Max.) (V<sub>DS</sub>=60V)
- Enhancement-Mode : V<sub>th</sub>=0.8~2.0V (I<sub>D</sub>=1mA)



MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC                                | SYMBOL               | RATING  | UNIT |
|---|----------------------|---------|------|
| Drain-Source Voltage                          | V <sub>DSS</sub>     | 60      | V    |
| Gate-Source Voltage                           | V <sub>GSS</sub>     | ±20     | V    |
| Drain Current                                 | I <sub>D</sub>       | 5       | A    |
| Peak Drain Current                            | I <sub>DP</sub>      | 20      |      |
| Drain Power Dissipation (1 Device Operation)  | P <sub>D</sub>       | 2.2     | W    |
| Drain Power Dissipation (4 Devices Operation) | T <sub>a</sub> =25°C | 4.4     | W    |
|   | T <sub>c</sub> =25°C | 28      |      |
| Channel Temperature                           | T <sub>ch</sub>      | 150     | °C   |
| Storage Temperature Range                     | T <sub>stg</sub>     | -55~150 | °C   |

ARRAY CONFIGURATION



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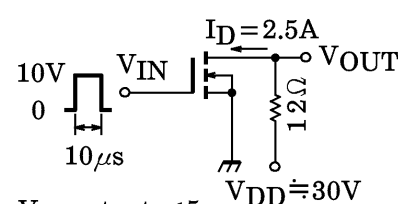


**THERMAL CHARACTERISTICS**

| CHARACTERISTIC   | SYMBOL                | MAX. | UNIT   |
|--|-----------------------|------|--------|
| Thermal Resistance of Channel to Ambient<br>(4 Devices Operation, Ta=25°C)   | $\Sigma R_{th(ch-a)}$ | 28.4 | °C / W |
| Thermal Resistance of Channel to Case<br>(4 Devices Operation, Tc=25°C)      | $\Sigma R_{th(ch-c)}$ | 4.46 | °C / W |
| Maximum Lead Temperature for Soldering Purposes<br>(3.2mm from Case for 10s) | T <sub>L</sub>        | 260  | °C     |

This Transistor is an Electrostatic Sensitive Device. Please Handle with Caution.

**ELECTRICAL CHARACTERISTICS (Ta = 25°C)**

| CHARACTERISTIC                                     | SYMBOL               | TEST CONDITION   | MIN.  | TYP. | MAX. | UNIT |    |
|--|----------------------|--|---|------|------|------|----|
| Gate Leakage Current                               | I <sub>GSS</sub>     | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0                          | —   | —    | ±10  | μA   |    |
| Drain Cut-off Current                              | I <sub>DSS</sub>     | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0                           | —   | —    | 100  | μA   |    |
| Drain-Source Breakdown Voltage                     | V (BR) DSS           | I <sub>D</sub> = 10mA, V <sub>GS</sub> = 0                           | 60  | —    | —    | V    |    |
| Gate Threshold Voltage                             | V <sub>th</sub>      | V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA                          | 0.8   | —    | 2.0  | V    |    |
| Forward Transfer Admittance                        | Y <sub>fs</sub>      | V <sub>DS</sub> = 10V, I <sub>D</sub> = 2.5A                         | 3.0   | 5.0  | —    | S    |    |
| Drain-Source ON Resistance                         | R <sub>DS (ON)</sub> | I <sub>D</sub> = 2.5A, V <sub>GS</sub> = 4V                          | —   | 0.21 | 0.31 | Ω    |    |
|  |                      | I <sub>D</sub> = 2.5A, V <sub>GS</sub> = 10V                         | —   | 0.12 | 0.16 |      |    |
| Input Capacitance                                  | C <sub>iss</sub>     | V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1MHz                 | —   | 370  | —    | pF   |    |
| Reverse Transfer Capacitance                       | C <sub>rss</sub>     |  | —   | 60   | —    |      |    |
| Output Capacitance                                 | C <sub>oss</sub>     |  | —   | 180  | —    |      |    |
| Switching Time                                     | Rise Time            | t <sub>r</sub>   |  <p>V<sub>IN</sub> : t<sub>r</sub>, t<sub>f</sub> &lt; 5ns,<br/>Duty Cycle ≤ 1%</p> | —    | 18   | —    | ns |
|  | Turn-on Time         | t <sub>on</sub>  |   | —    | 25   | —    |    |
|  | Fall Time            | t <sub>f</sub>   |   | —    | 15   | —    |    |
|  | Turn-off Time        | t <sub>off</sub>   |   | —    | 170  | —    |    |
| Total Gate Charge<br>(Gate-Source Plus Gate-Drain) | Q <sub>g</sub>       | I <sub>D</sub> = 5A, V <sub>GS</sub> = 10V,<br>V <sub>DD</sub> = 48V | —   | 12   | —    | nC   |    |
| Gate-Source Charge                                 | Q <sub>gs</sub>      |  | —   | 8    | —    |      |    |
| Gate-Drain ("Miller") Charge                       | Q <sub>gd</sub>      |  | —   | 4    | —    |      |    |

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## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC             | SYMBOL    | TEST CONDITION        | MIN. | TYP. | MAX. | UNIT |
|----------------------------|-----------|-----------------------|------|------|------|------|
| Drain Reverse Current      | $I_{DR}$  | —                     | —    | —    | 5    | A    |
| Peak Drain Reverse Current | $I_{DRP}$ | —                     | —    | —    | 20   | A    |
| Diode Forward Voltage      | $V_{DSF}$ | $I_{DR}=5A, V_{GS}=0$ | —    | —    | -1.7 | V    |

## FLYBACK-DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC          | SYMBOL   | TEST CONDITION | MIN. | TYP. | MAX. | UNIT    |
|-------------------------|----------|----------------|------|------|------|---------|
| Maximum Forward Current | $I_{FM}$ | —              | —    | —    | 5    | A       |
| Reverse Current         | $I_R$    | $V_R=120V$     | —    | —    | 0.4  | $\mu A$ |
| Reverse Voltage         | $V_R$    | $I_R=100\mu A$ | 120  | —    | —    | V       |
| Forward Voltage         | $V_F$    | $I_F=1A$       | —    | —    | 1.8  | V       |