

TOSHIBA BIPOLAR DIGITAL INTEGRATED CIRCUIT MULTI CHIP

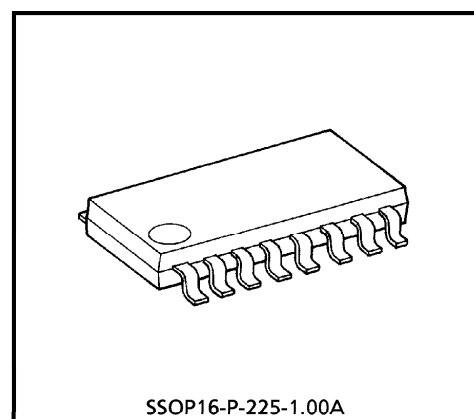
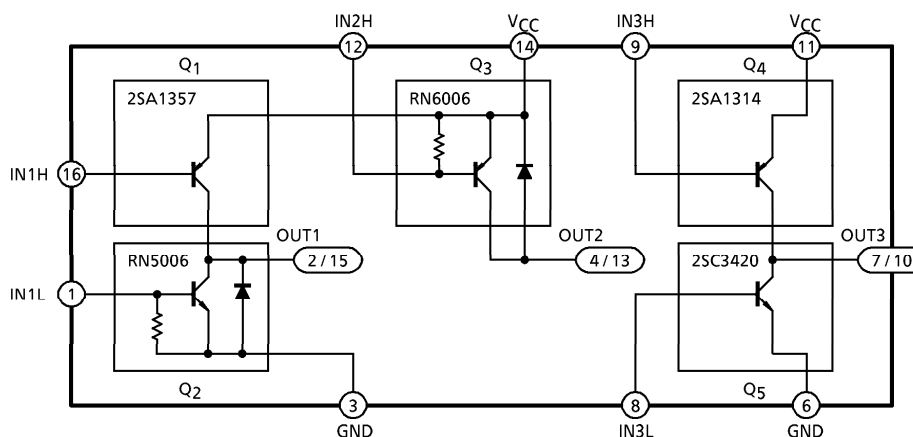
**TD62M3704F****LOW SATURATION VOLTAGE H-BRIDGE DRIVER FOR MOTOR**

TD62M3704F is Multi Chip IC incorporates 5 low saturation discrete transistors which equipped fly-wheeling diodes and bias resistor.

This IC is suitable for a battery use motor drive applications.

**FEATURES**

- ch1 (Upper) : 2SA1357  
ch1 (Lower) : RN5006-Fly-wheeling Diode and Bias Resistor equipped
- ch2 (Upper) : RN6006-Fly-wheeling Diode and Bias Resistor equipped
- ch3 (Upper) : 2SA1314  
ch3 (Lower) : 2SC3420
- Suitable for High Efficiency Motor drive circuit
- External Input Resistor
- SSOP16 1mm pitch small package sealed

**BLOCK DIAGRAM**

Weight : 0.14g (Typ.)

961001EBA2

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## PIN CONNECTION (TOP VIEW)

|      |   |    |                 |
|------|---|----|-----------------|
| IN1L | 1 | 16 | IN1H            |
| OUT1 | 2 | 15 | OUT1            |
| GND  | 3 | 14 | V <sub>CC</sub> |
| OUT2 | 4 | 13 | OUT2            |
| NC   | 5 | 12 | IN2H            |
| GND  | 6 | 11 | V <sub>CC</sub> |
| OUT3 | 7 | 10 | OUT3            |
| IN3L | 8 | 9  | IN3H            |

## MAXIMUM RATINGS (Ta = 25°C)

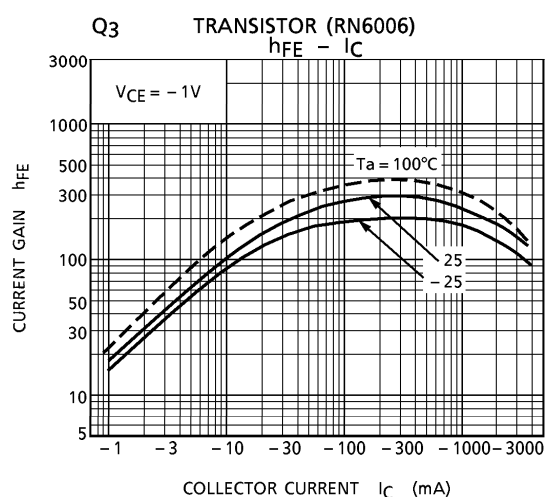
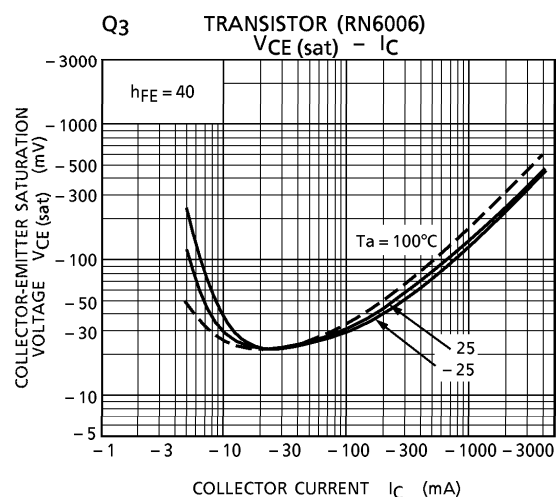
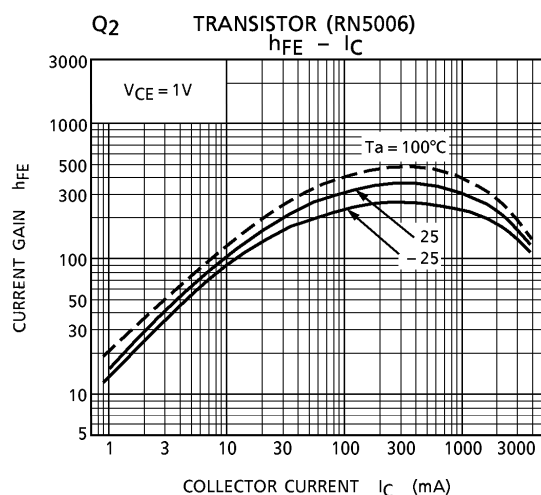
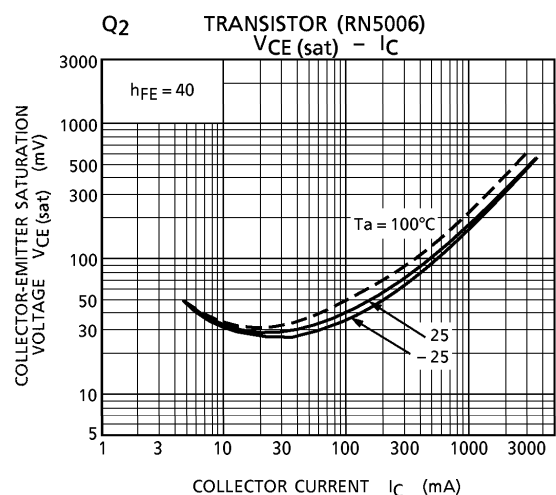
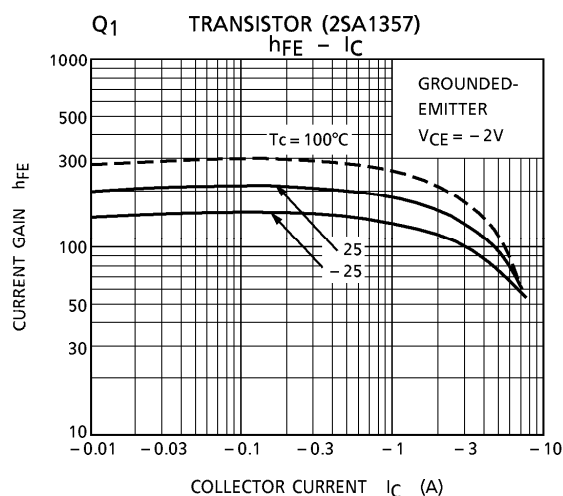
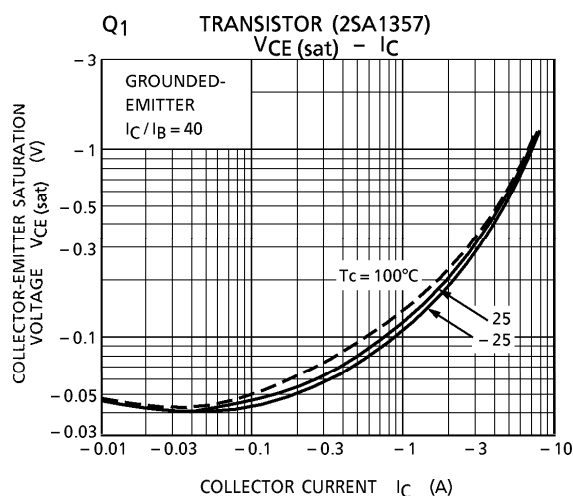
| CHARACTERISTIC        | SYMBOL                            | RATING                          | UNIT |
|-----------------------|-----------------------------------|---------------------------------|------|
| Supply Voltage        | V <sub>CC</sub>                   | 10                              | V    |
| Breakdown Voltage     | V <sub>CBO</sub>                  | 10                              | V    |
|                       | V <sub>CEO</sub> (Note 2)         | 10                              |      |
|                       | V <sub>EBO</sub>                  | Q <sub>1</sub> , Q <sub>5</sub> |      |
|                       |                                   | Q <sub>2</sub> , Q <sub>3</sub> |      |
|                       |                                   | Q <sub>4</sub>                  |      |
| Output Current        | I <sub>O</sub> (AVE)              | Q <sub>1</sub> , Q <sub>5</sub> | A    |
|                       |                                   | Q <sub>2</sub> ~Q <sub>4</sub>  |      |
|                       | I <sub>O</sub> (PEAK)<br>(Note 1) | Q <sub>1</sub> , Q <sub>5</sub> | A    |
|                       |                                   | Q <sub>2</sub> ~Q <sub>4</sub>  |      |
| Base Current          | I <sub>B</sub>                    | Q <sub>1</sub> , Q <sub>5</sub> | A    |
|                       |                                   | Q <sub>2</sub> ~Q <sub>4</sub>  |      |
| Power Dissipation     | P <sub>D</sub>                    | 490                             | mW   |
| Junction Temperature  | T <sub>j</sub>                    | 150                             | °C   |
| Operating Temperature | T <sub>opr</sub>                  | – 40~85                         | °C   |
| Storage Temperature   | T <sub>stg</sub>                  | – 55~150                        | °C   |

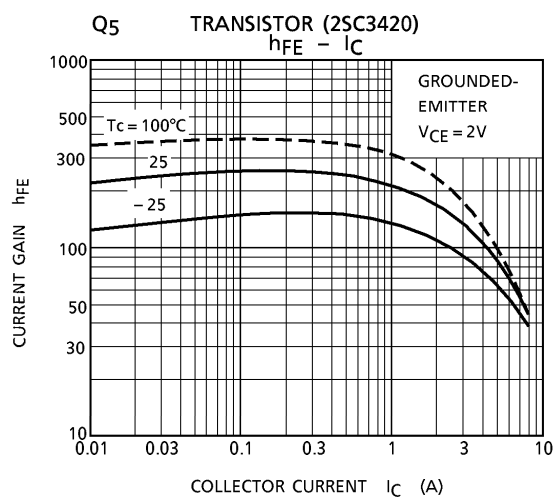
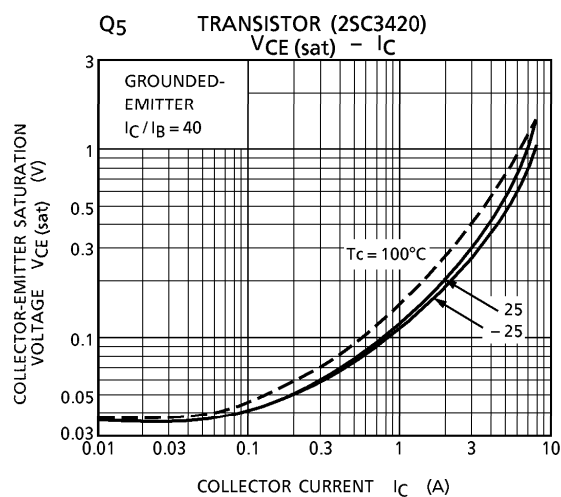
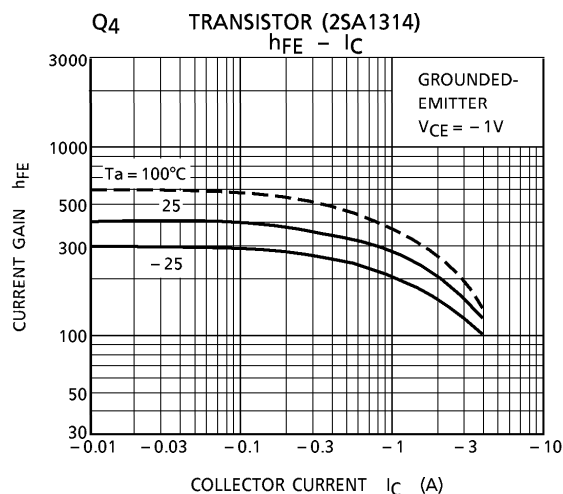
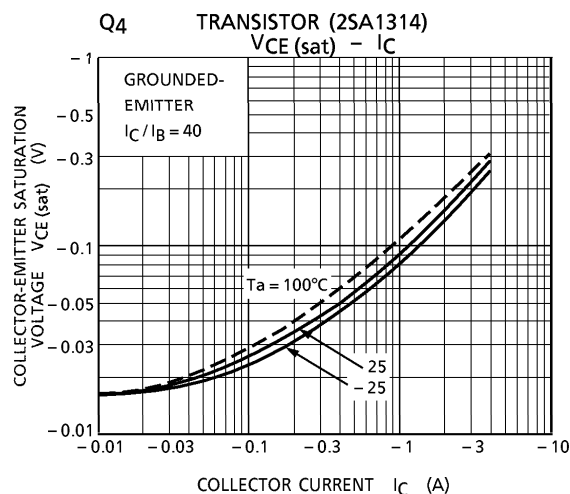
(Note 1) T = 10ms MAX. and maximum duty is less than 30%.

(Note 2) Q<sub>5</sub> : 2SC3420 = 15V

## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

| CHARACTERISTIC                     |                                                  | SYMBOL                | TEST CIR-<br>CUIT | TEST CONDITION                              | MIN. | TYP. | MAX. | UNIT |
|------------------------------------|--------------------------------------------------|-----------------------|-------------------|---------------------------------------------|------|------|------|------|
| Current Gain                       | Q <sub>1</sub>                                   | h <sub>FE</sub> (1)   | —                 | V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.5A | 100  | —    | 600  | —    |
|                                    |                                                  | h <sub>FE</sub> (2)   | —                 | V <sub>CE</sub> = 2V, I <sub>C</sub> = 4.0A | 70   | —    | —    |      |
|                                    | Q <sub>5</sub>                                   | h <sub>FE</sub> (1)   | —                 | V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.5A | 140  | —    | 600  |      |
|                                    |                                                  | h <sub>FE</sub> (2)   | —                 | V <sub>CE</sub> = 2V, I <sub>C</sub> = 4.0A | 70   | —    | —    |      |
|                                    | Q <sub>4</sub>                                   | h <sub>FE</sub> (1)   | —                 | V <sub>CE</sub> = 1V, I <sub>C</sub> = 0.5A | 200  | —    | 650  |      |
|                                    |                                                  | h <sub>FE</sub> (2)   | —                 | V <sub>CE</sub> = 1V, I <sub>C</sub> = 2.0A | 60   | 130  | —    |      |
|                                    | Q <sub>2</sub> , Q <sub>3</sub>                  | h <sub>FE</sub> (1)   | —                 | V <sub>CE</sub> = 1V, I <sub>C</sub> = 0.5A | 160  | —    | 600  |      |
|                                    |                                                  | h <sub>FE</sub> (2)   | —                 | V <sub>CE</sub> = 1V, I <sub>C</sub> = 2.0A | 60   | 130  | —    |      |
| Saturation Voltage                 | Q <sub>1</sub>                                   | V <sub>CE</sub> (sat) | —                 | I <sub>C</sub> = 1A, I <sub>B</sub> = 25mA  | —    | 0.15 | 0.25 | V    |
|                                    |                                                  |                       |                   | I <sub>C</sub> = 3A, I <sub>B</sub> = 75mA  | —    | 0.38 | 0.70 |      |
|                                    | Q <sub>5</sub>                                   | V <sub>CE</sub> (sat) | —                 | I <sub>C</sub> = 1A, I <sub>B</sub> = 25mA  | —    | 0.16 | 0.25 |      |
|                                    |                                                  |                       |                   | I <sub>C</sub> = 3A, I <sub>B</sub> = 75mA  | —    | 0.40 | 0.70 |      |
|                                    | Q <sub>3</sub> , Q <sub>4</sub>                  | V <sub>CE</sub> (sat) | —                 | I <sub>C</sub> = 1A, I <sub>B</sub> = 25mA  | —    | 0.14 | 0.25 |      |
|                                    |                                                  |                       |                   | I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA  | —    | 0.25 | 0.45 |      |
|                                    | Q <sub>2</sub>                                   | V <sub>CE</sub> (sat) | —                 | I <sub>C</sub> = 1A, I <sub>B</sub> = 25mA  | —    | 0.17 | 0.32 |      |
|                                    |                                                  |                       |                   | I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA  | —    | 0.31 | 0.45 |      |
| Fly-wheeling Diode Forward Voltage | Q <sub>2</sub> , Q <sub>3</sub>                  | V <sub>F</sub>        | —                 | I <sub>F</sub> = 300mA                      | —    | 0.89 | 1.2  | V    |
| Transition Frequency               |                                                  | f <sub>T</sub>        | —                 | V <sub>CE</sub> = 2V, I <sub>C</sub> = 0.5A | —    | 100  | —    | MHz  |
| Leakage Current                    |                                                  | I <sub>OL</sub>       | —                 | V <sub>CC</sub> = 10V                       | —    | 0    | 10   | μA   |
| Base-Emitter Forward Voltage       | Q <sub>1</sub> , Q <sub>5</sub>                  | V <sub>BE</sub>       | —                 | V <sub>CE</sub> = 2V, I <sub>C</sub> = 3.0A | —    | 0.84 | 1.5  | V    |
|                                    | Q <sub>2</sub> , Q <sub>3</sub> , Q <sub>4</sub> |                       | —                 | V <sub>CE</sub> = 1V, I <sub>C</sub> = 2.0A | —    | 0.84 | 1.5  |      |
| Base-Emitter Resistor              |                                                  | R <sub>BE</sub>       | —                 | —                                           | 7    | 10   | 13   | kΩ   |





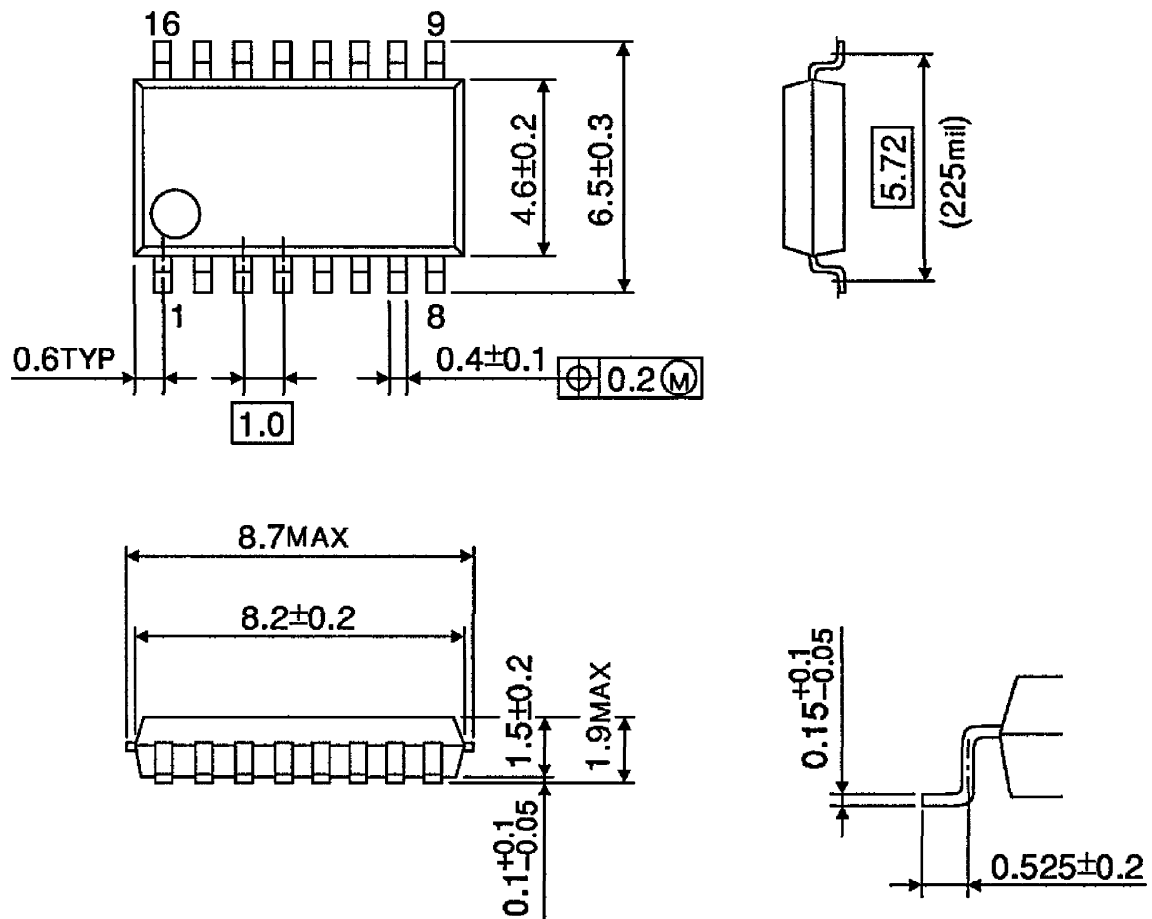
#### PRECAUTIONS for USING

Utmost care is necessary in the design of the output line,  $V_{CC}$  and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

**OUTLINE DRAWING**

SSOP16-P-225-1.00A

Unit : mm



Weight : 0.14g (Typ.)