

# TRANSISTOR MODULE (THREE PHASES BRIDGE TYPE)

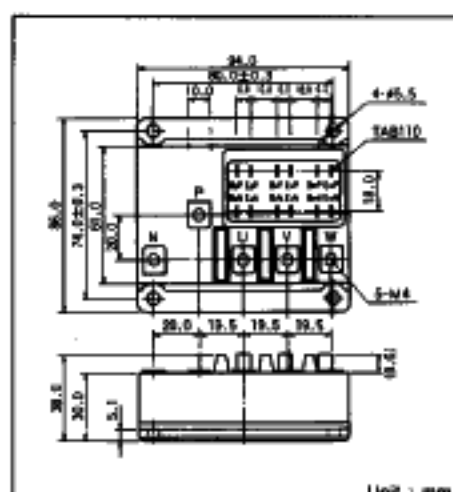
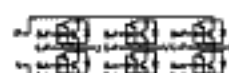
## QF50AA40/60

QF50AA is a six pack Darlington power transistor module which has six transistors connected in three phase bridge configuration. Each transistor has a reverse paralleled fast recovery diode. The mounting base of the module is electrically isolated from semiconductor elements for simple heatsink construction.

- $I_c = 50A$   $V_{CE} = 400/600V$
- Low saturation voltage for higher efficiency.
- High DC current gain  $h_{FE}$
- Isolated mounting base
- $V_{CEO} = 10V$  for faster switching speed.

(Applications)

Motor Control (VVVF), AC Servo, UPS



Unit: mm

$T_j = 25^\circ C$

### Maximum Ratings

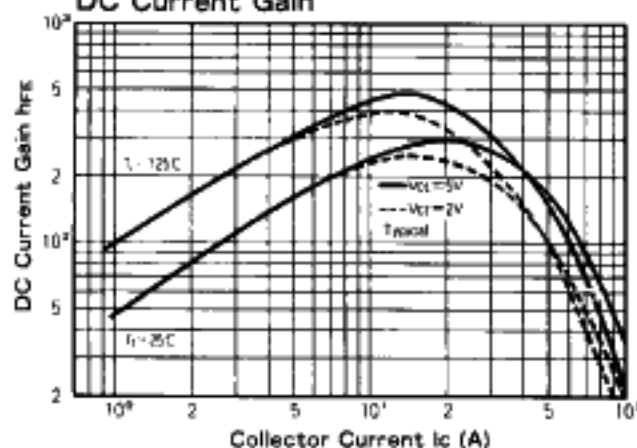
| Symbol           | Item                      |               | Conditions                        | Ratings  |          | Unit            |
|------------------|---------------------------|---------------|-----------------------------------|----------|----------|-----------------|
|                  |                           |               |                                   | QF50AA40 | QF50AA60 |                 |
| V <sub>CB0</sub> | Collector-Base Voltage    |               |                                   | 400      | 600      | V               |
| V <sub>CEX</sub> | Collector-Emitter Voltage |               | V <sub>BE</sub> = -2V             | 400      | 600      | V               |
| V <sub>EB0</sub> | Emitter-Base Voltage      |               |                                   | 10       |          | V               |
| I <sub>c</sub>   | Collector Current         |               | ( ) = p <sub>w</sub> ≤ 1ms        | 50 (100) |          | A               |
| -I <sub>c</sub>  | Reverse Collector Current |               |                                   | 50       |          | A               |
| I <sub>b</sub>   | Base Current              |               |                                   | 3        |          | A               |
| P <sub>T</sub>   | Total power dissipation   |               | T <sub>c</sub> = 25°C             | 300      |          | W               |
| T <sub>j</sub>   | Junction Temperature      |               |                                   | -40~+150 |          | °C              |
| T <sub>stg</sub> | Storage Temperature       |               |                                   | -40~+125 |          | °C              |
| V <sub>iso</sub> | Isolation Voltage         |               | A.C. 1minute                      | 2500     |          | V               |
|                  | Mounting Torque           | (M5)          | Recommended Value 1.5~2.5 (15~25) | 2.7 (28) |          | N·m<br>(kgf·cm) |
|                  |                           | Terminal (M4) | Recommended Value 1.0~1.4 (10~14) | 1.5 (15) |          |                 |
|                  | Mass                      |               | Typical value                     | 400      |          | g               |

### Electrical Characteristics

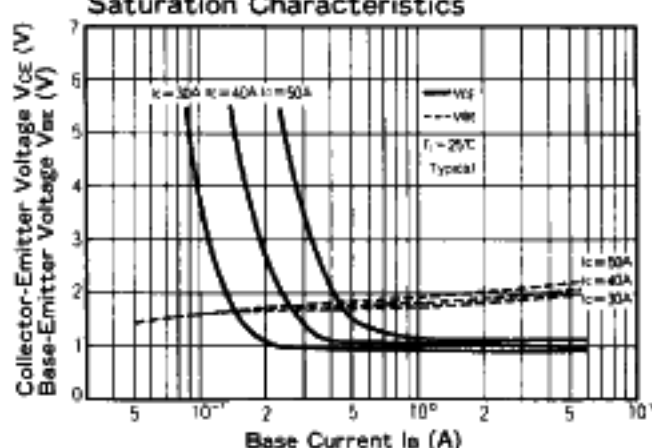
$T_j = 25^\circ C$

| Symbol         | Item                                 | Conditions                             | Ratings |      | Unit         |
|----------------|--------------------------------------|----------------------------------------|---------|------|--------------|
|                |                                      |                                        | Min.    | Max. |              |
| $I_{C0}$       | Collector Cut-off Current            | $V_{CB} = V_{CB0}$                     |         | 1.0  | mA           |
| $I_{E0}$       | Emitter Cut-off Current              | $V_{EB} = V_{EB0}$                     |         | 300  | mA           |
| $V_{CE0(SUS)}$ | Collector-Emitter Sustaining Voltage | QF50AA40<br>$I_c = 1A$                 | 300     |      | V            |
|                |                                      | QF50AA60                               | 450     |      |              |
| $V_{CEX(SUS)}$ | Collector-Emitter Sustaining Voltage | QF50AA40<br>$I_c = 10A$ $I_{B2} = -5A$ | 400     |      | V            |
|                |                                      | QF50AA60                               | 600     |      |              |
| $h_{FE}$       | DC Current Gain                      | $I_c = 50A$ $V_{CE} = 2V$              | 75      |      |              |
|                |                                      | $I_c = 50A$ $V_{CE} = 5V$              | 100     |      |              |
| $V_{CE(sat)}$  | Collector-Emitter Saturation Voltage | $I_c = 50A$ $I_B = 0.67A$              |         | 2.0  | V            |
| $V_{BE(sat)}$  | Base-Emitter Saturation Voltage      | $I_c = 50A$ $I_B = 0.67A$              |         | 2.5  | V            |
| $t_{on}$       | Switching Time                       | On Time                                |         | 1.0  | $\mu s$      |
| $t_s$          |                                      | Storage Time                           |         | 12.0 |              |
| $t_f$          |                                      | Fall Time                              |         | 2.0  |              |
| $V_{CEO}$      | Collector-Emitter Reverse Voltage    | $-I_c = 50A$                           |         | 1.4  | V            |
| $R_{th(j-c)}$  | Thermal Impedance (junction to case) | Transistor part                        |         | 0.4  | $^\circ C/W$ |
|                |                                      | Diode part                             |         | 1.3  |              |

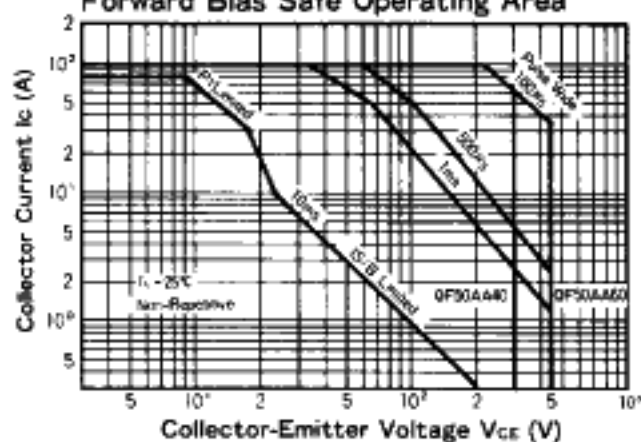
DC Current Gain



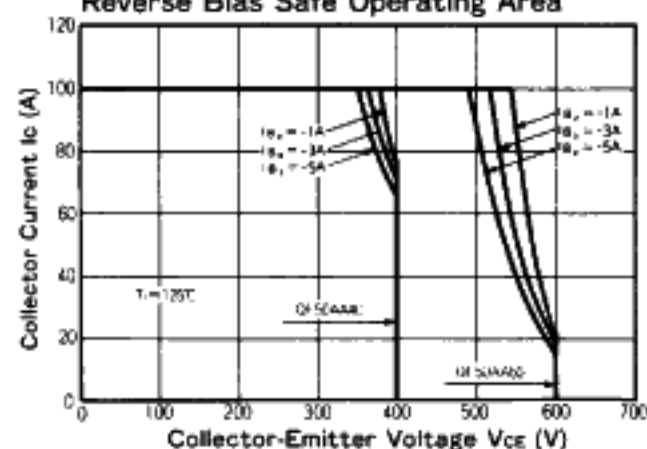
Saturation Characteristics



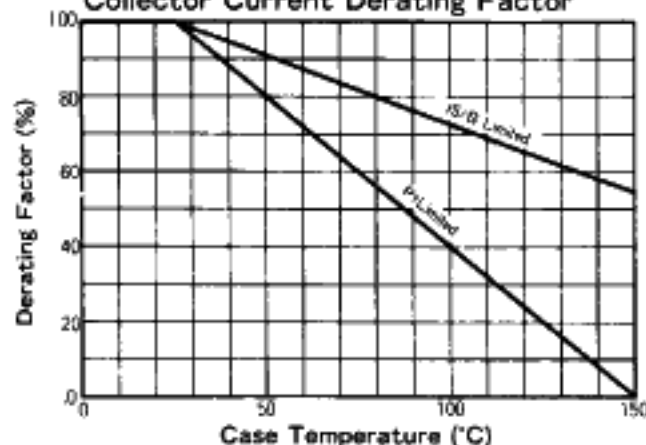
Forward Bias Safe Operating Area



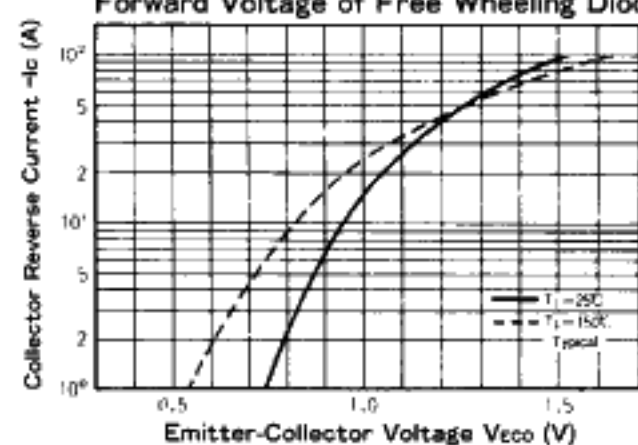
Reverse Bias Safe Operating Area



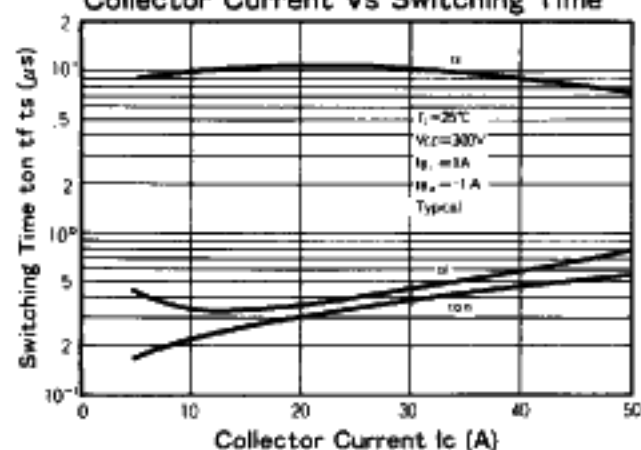
Collector Current Derating Factor



Forward Voltage of Free Wheeling Diode



Collector Current Vs Switching Time



Maximum Transient Thermal Impedance Characteristics

