

# TRANSISTOR MODULE (Hi-β)

## SQD400BA60



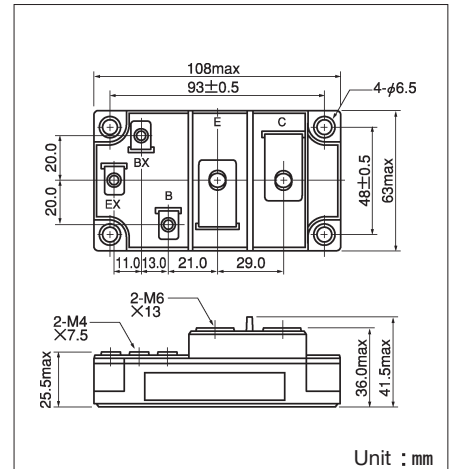
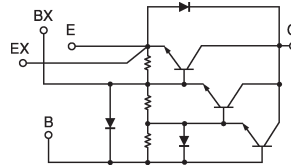
UL;E76102 (M)

SQD400BA60 is a Darlington power transistor module with a **ULTRA HIGH**  $h_{FE}$ , high speed, high power Darlington transistor. The transistor has a reverse paralleled fast recovery diode ( $t_{rr}$  : 200ns). The mounting base of the module is electrically isolated from semiconductor elements for simple heatsink construction,

- $I_C=400A$ ,  $V_{CEX}=600V$
- Low saturation voltage for higher efficiency.
- ULTRA HIGH DC current gain  $h_{FE}$ .  $h_{FE} \geq 750$
- Isolated mounting base
- $V_{EBO}$  10V for faster switching speed.

### (Applications)

Motor Control (VVF), AC/DC Servo,  
UPS, Switching  
Power Supply, Ultrasonic Application



### Maximum Ratings

( $T_j=25^\circ C$ )

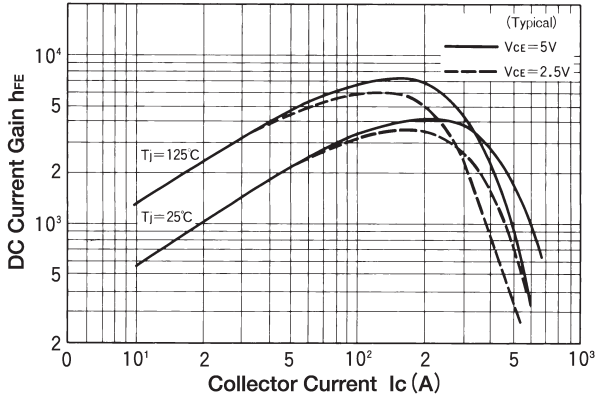
| Symbol    | Item                      | Conditions           | Ratings                      |            |                 |
|-----------|---------------------------|----------------------|------------------------------|------------|-----------------|
|           |                           |                      | SQD400BA60                   | Unit       |                 |
| $V_{CBO}$ | Collector-Base Voltage    |                      | 600                          | V          |                 |
| $V_{CEX}$ | Collector-Emitter Voltage | $V_{BE} = -2V$       | 600                          | V          |                 |
| $V_{EBO}$ | Emitter-Base Voltage      |                      | 10                           | V          |                 |
| $I_C$     | Collector Current         | ( ) = $p_w \leq 1ms$ | 400 (800)                    | A          |                 |
| $-I_C$    | Reverse Collector Current |                      | 400                          | A          |                 |
| $I_B$     | Base Current              |                      | 24                           | A          |                 |
| $P_T$     | Total power dissipation   | $T_C = 25^\circ C$   | 1500                         | W          |                 |
| $T_j$     | Junction Temperature      |                      | -40 ~ +150                   | $^\circ C$ |                 |
| $T_{stg}$ | Storage Temperature       |                      | -40 ~ +125                   | $^\circ C$ |                 |
| $V_{ISO}$ | Isolation Voltage         | A.C.1minute          | 2500                         | V          |                 |
|           | Mounting Torque           | Mounting (M6)        | Recommended Value 43kgf·cm   | 4.7 (48)   | N·m<br>(kgf·cm) |
|           |                           | Terminal (M6)        | Recommended Value 43kgf·cm   | 4.7 (48)   |                 |
|           |                           | Terminal (M4)        | Recommended Value 12.5kgf·cm | 1.5 (15)   |                 |
|           | Mass                      | Typical Value        | 460                          | g          |                 |

### Electrical Characteristics

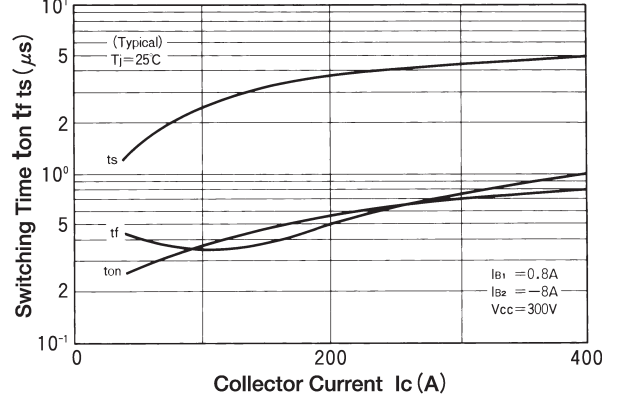
( $T_j=25^\circ C$ )

| Symbol         | Item                                 | Conditions  | Ratings                       |      |       | Unit         |
|----------------|--------------------------------------|---|-------------------------------|------|-------|--------------|
|                |                                      |   | Min.                          | Typ. | Max.  |              |
| $I_{CBO}$      | Collector Cut-off Current            | $V_{CB} = V_{CBO}$  |                               |      | 4.0   | mA           |
| $I_{EBO}$      | Emitter Cut-off Current              | $V_{EB} = V_{EBO}$  |                               |      | 1600  | mA           |
| $V_{CEO(SUS)}$ | Collector Emitter Sustaining Voltage | $I_C = 1A$  | 450                           |      |       | V            |
| $V_{CEX(SUS)}$ |                                      | $I_C = 80A, I_{B2} = -8A$                                       | 600                           |      |       |              |
| $h_{FE}$       | DC Current Gain                      | $I_C = 400A, V_{CE} = 2.5V$                                     | 750                           |      |       |              |
| $V_{CE(sat)}$  | Collector-Emitter Saturation Voltage | $I_C = 400A, I_B = 530mA$                                       |                               |      | 2.5   | V            |
| $V_{BE(sat)}$  | Base-Emitter Saturation Voltage      | $I_C = 400A, I_B = 530mA$                                       |                               |      | 3.0   | V            |
| $t_{on}$       | Switching Time                       | On Time   |                               |      | 2.0   | $\mu s$      |
| $t_s$          |                                      | Storage Time  | $V_{CC} = 300V, I_C = 400A$   |      | 8.0   |              |
| $t_f$          |                                      | Fall Time   | $I_{B1} = 0.8A, I_{B2} = -8A$ |      | 2.0   |              |
| $V_{ECO}$      | Collector-Emitter Reverse Voltage    | $-I_C = 400A$   |                               |      | 1.8   | V            |
| $t_{rr}$       | Reverse Recovery time                | $V_{CC} = 300V, I_C = -400A, -di/dt = 300A/\mu s, V_{BE} = -5V$ |                               | 200  |       | ns           |
| $R_{th(j-c)}$  | Thermal Impedance (junction to case) | Transistor part   |                               |      | 0.083 | $^\circ C/W$ |
|                |                                      | Diode part  |                               |      | 0.25  |              |

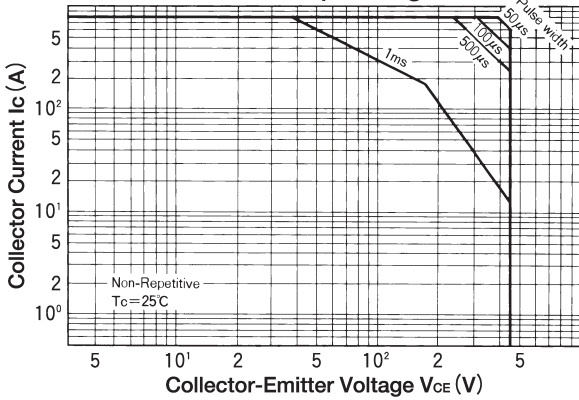
### D.C. Current Gain



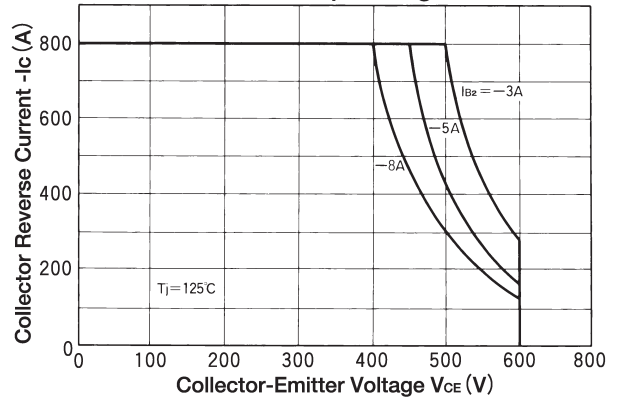
### Collector Current Vs Switching Time



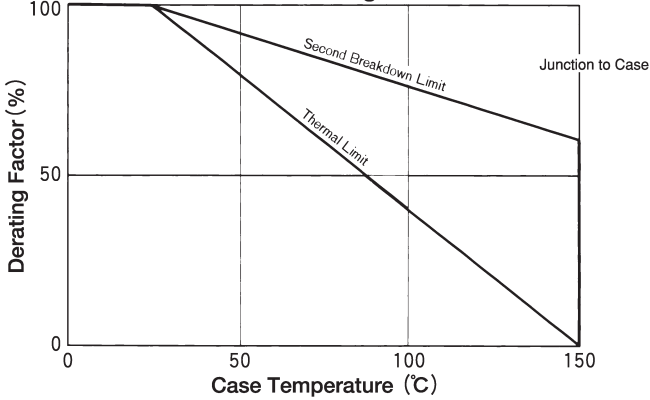
### Forward Bias Safe Operating Area



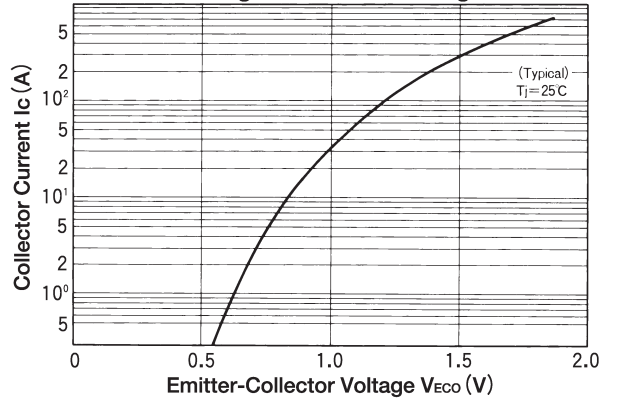
### Reverse Bias Safe Operating Area



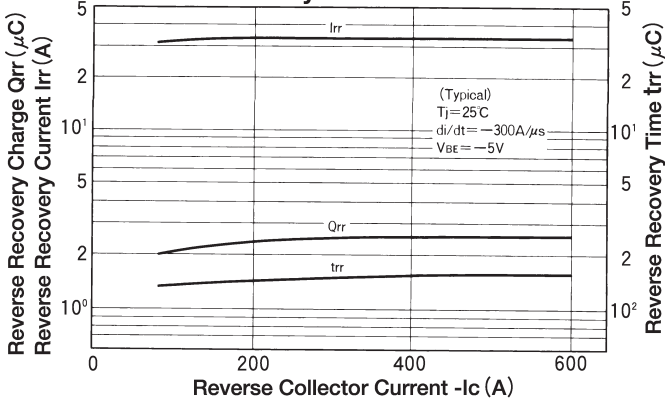
### Collector Current Derating Factor



### Forward Voltage of Free Wheeling Diode



### Reverse Recovery Characteristics



### Transient Thermal Impedance

