

Switching behavior of 3.3kV,400A dual HVIGBT (CM400DY-66H)

There are some differences of turn-on characteristics between upper and lower IGBTs due to the below mechanism.

When an IGBT turns on and reverse recovery current flows through FWDi of the other side, current from power source flows in loop(Fig.1).

If you use a main connector like type A shown in Fig.2, the main connector current flows in loop and magnetic flux is generated perpendicularly as the result(Fig.3).

The magnetic flux influences turn-on characteristics of the upper IGBT because the auxiliary emitter (E2) is inside the loop current, while the lower IGBT is not under influence of the magnetic flux because the auxiliary emitter (E1) is outside the loop current.

To avoid the influence of the magnetic flux, we recommend a main connector like type B shown in Fig.4.

By using the connector, the main connector current dose not flow in loop. Therefore both upper and lower IGBTs have nearly the same turn-on characteristics.

We measured turn-on characteristics in each case of using type A and type B main connector comparatively and the results are shown in Fig.5,6,7,8.

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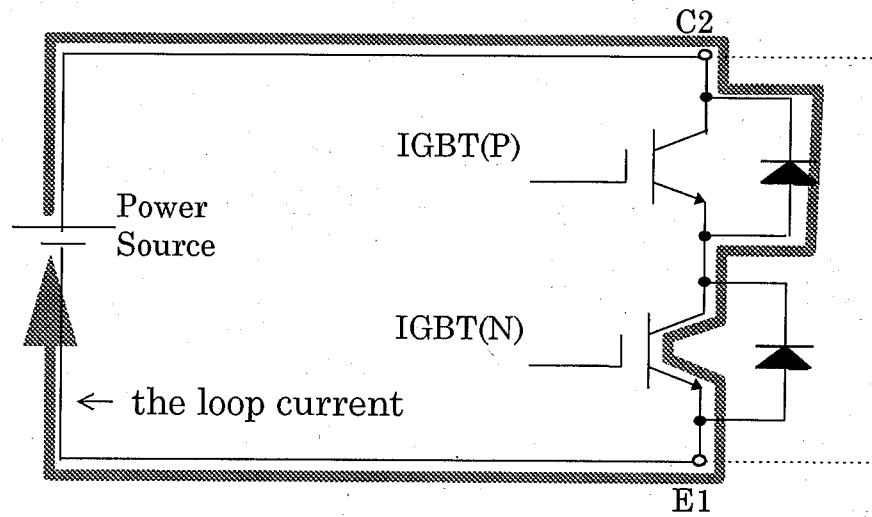


Fig.1 Path of the loop current from power source

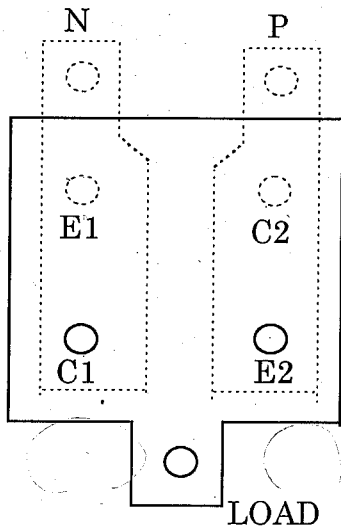


Fig.2. The shape of Type A main connector

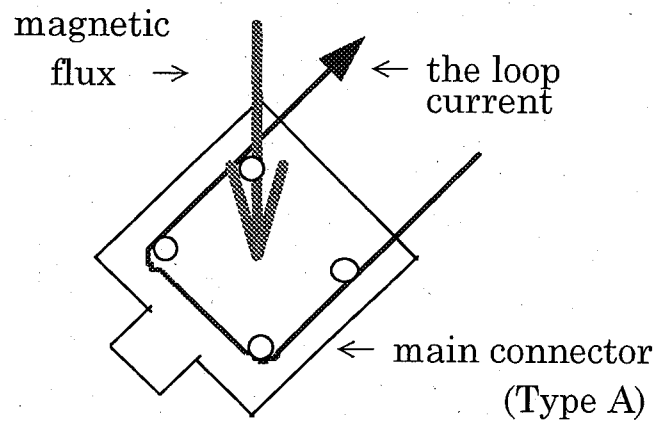


Fig.3. Schematic view of magnetic flux

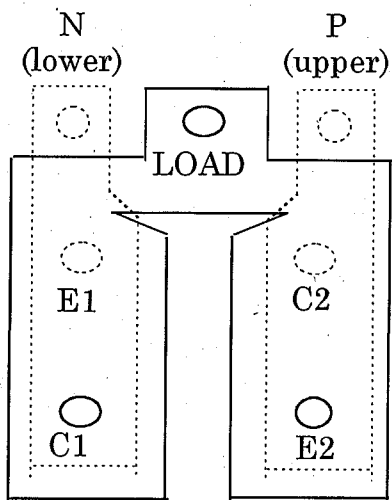


Fig.4. The shape of Type B main connector

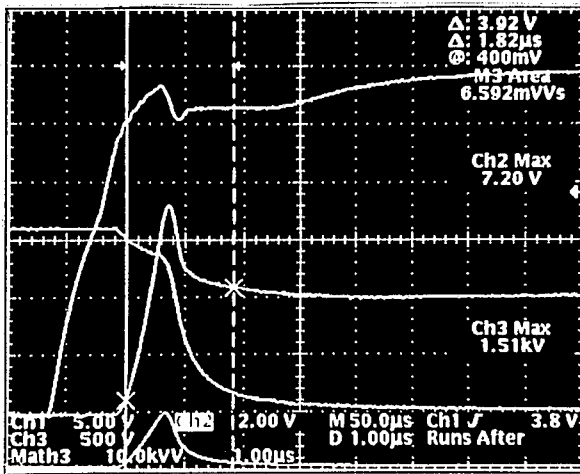


Fig.5: C1-E1 Turn-on wave form
main connector: Type A

$V_{GE} = 5 \text{ V/div}, I_c = 200 \text{ A/div}, V_{CC} = 500 \text{ V/div}$

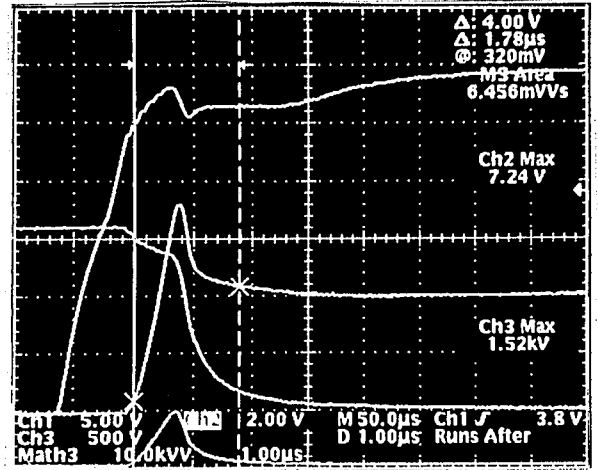


Fig.6: C1-E1 Turn-on wave form
main connector: Type B

$V_{GE} = 5 \text{ V/div}, I_c = 200 \text{ A/div}, V_{CC} = 500 \text{ V/div}$

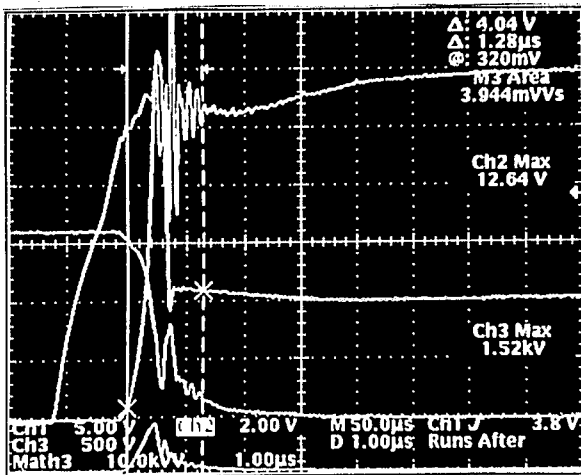


Fig.7: C2-E2 Turn-on wave form
main connector: Type A

$V_{GE} = 5 \text{ V/div}, I_c = 200 \text{ A/div}, V_{CC} = 500 \text{ V/div}$

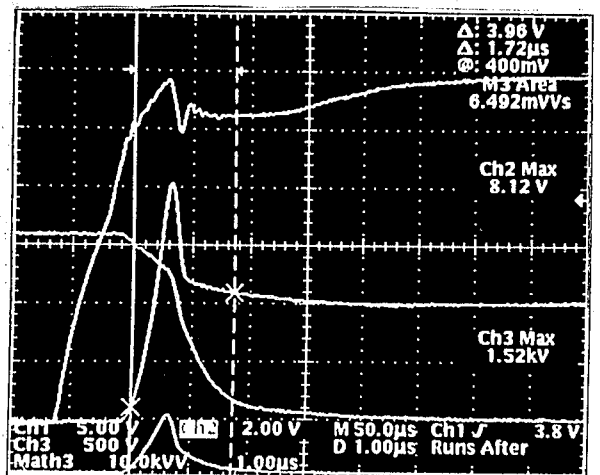


Fig.8: C2-E2 Turn-on wave form
main connector: Type B

$V_{GE} = 5 \text{ V/div}, I_c = 200 \text{ A/div}, V_{CC} = 500 \text{ V/div}$