FUJI IGBT Module 6MBI800XV-075V-01

Parallel connection of IGBT modules

The proportion of current sharing between IGBT modules in parallel connection, called the current imbalance ratio α. This ratio is determined by the variation of $V_{CE(sat)}$ of the IGBT's itself and the junction temperature dependence of the output characteristics. The current imbalance ratio α is determined using Equation 1 which sets the current value I_{C1} in relation to the average current $I_{C(ave)}$ [=(I_{C1}+I_{C2}) / 2] of the two paralleled modules.

The dependency between the current imbalance ratio α and the variation $\Delta V_{CE(sat)}$ of IGBT and ΔV_F of FWD for two IGBT modules in parallel are shown in Figure 2.

$$\alpha = \left| \frac{I_{C1}}{I_{C(ave)}} - 1 \right| \times 100 \qquad \text{(Equation 1)}$$

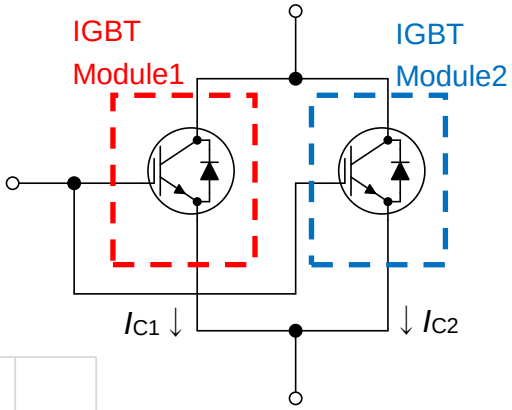

Figure 1

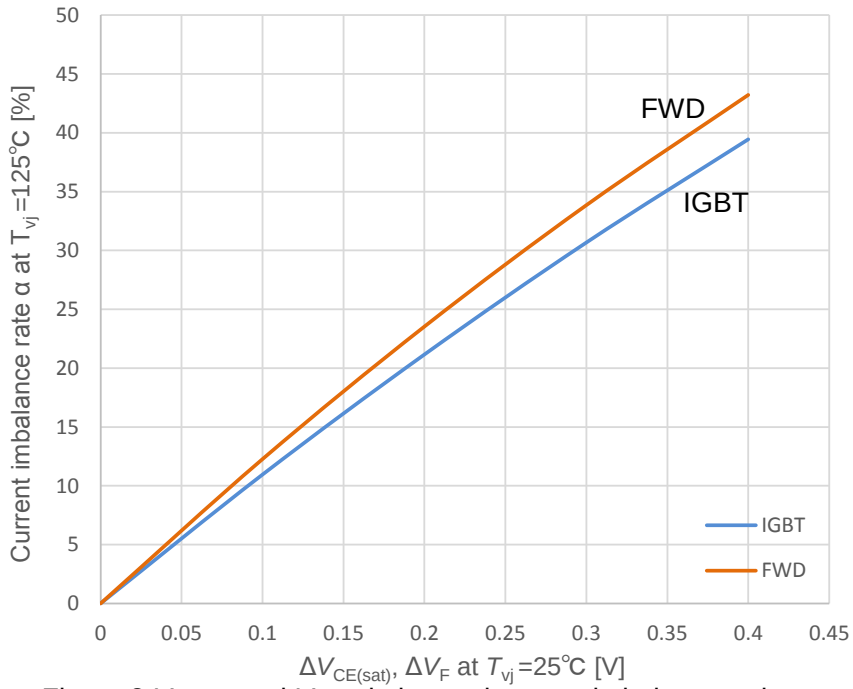

Figure 2 $V_{CE(sat)}$ and V_F variation and current imbalance ratio

When nIGBT modules are connected in parallel, the parallel connected maximum allowable current total current ΣI can be expressed in Equation 2 by using the current imbalance rate α at two-parallel connection. This parallel connected maximum allowable current ΣI is used for reference only.

$$\sum I = I_{C(max)} \left[1 + (n-1) \frac{\left(1 - \frac{\alpha}{100}\right)}{\left(1 + \frac{\alpha}{100}\right)} \right] \qquad \text{(Equation 2)}$$

$I_{C(max)}$: Maximum current for a single element
ΣI : Parallel connected maximum allowable current
n : Number of parallel connections

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