Selection of IGBT Gate Driver
Selection of CONCEPT IGBT Gate Driver Core

- Selection of IGBT driver by use of IGBT datasheet.
- For example: IGBT driver for Infineon IGBT module FF450R17KE4

![IGBT datasheet table]

- Blocking voltage 1700V
- Gate charge 4.6uC
- Internal Gate resistor 1.7ohm
Selection of CONCEPT IGBT Gate Driver Core

- Selection of IGBT driver by use of IGBT datasheet.
- For example: IGBT driver for Mitsubishi IGBT module CM800HA-66H

### Mitsubishi High Voltage IGBT Modules

**CM800HA-66H**

**HvIGBT** (High Voltage Insulated Gate Bipolar Transistor) Modules

#### MAXIMUM RATINGS

- **Symbol**: Vces, Vces, Vces
- **Conditions**: Ic = 80mA, Vces = 10V
- **Value**: 4.5, 6.0, 7.5 V

#### ELECTRICAL CHARACTERISTICS

- **Symbol**: Vces, Vces, Vces
- **Conditions**: Ic = 80mA, Vces = 10V
- **Value**: 4.5, 6.0, 7.5 V

- **Gate charge**: 0V to 20V in nC
  - Estimated for +15V/-10V = 4.5uC

- **Blocking voltage**: 3300V
  - No information about internal gate resistor
Calculation of Gate Driver Power

- **Gate drive power**
  
  $P_{\text{Gate}} = Q_G \cdot f_{\text{sw}} \cdot \Delta V$

- **Use of CGE**
  
  - Additional power by use of optional $C_{\text{GE}}$
  
  $P_{\text{Cge}} = C_{\text{GE}} \cdot f_{\text{sw}} \cdot \Delta V^2$

- **Total driver output power**
  
  $P = P_{\text{Gate}} + P_{\text{Cge}}$

- **Example with FF450R17ME4**
  
  - Gate charge 4.6μC
  - No $C_{\text{GE}}$
  - Switching frequency 4kHz
  
  $P = 4.6 \mu C \cdot 4kHz \cdot 25V$
  
  $P = 0.46W$
Calculation of Gate Current

- **Minimum gate resistor**
  - \( R_{\text{min}} = R_{G_{\text{min}}} + R_{\text{internal}} \)
  - Most of IGBT have embedded chip resistance

- **Peak output current**
  - \( I_{\text{max}} = 0.74 \cdot \frac{\Delta V}{(R_{G_{\text{min}}} + R_{\text{internal}})} \)

- **Example with FF450R17ME4**
  - \( P = P_{\text{Gate}} + P_{\text{Cge}} \)
  - \( R_{G_{\text{min}}} = 3.3 \Omega \)
  - \( R_{\text{internal}} = 1.7 \Omega \)
  - \( \Delta V = 25 \text{V} \)
  - \( I_{\text{max}} = 0.74 \cdot 25 \text{V} / 5 \Omega \)
  - \( I_{\text{max}} = 3.7 \text{A} \)

The theoretically derived reduction factor of 0.74 for \( I_{\text{max(non-osc)}} \) is further reduced in real applications by the limited driver switching speed, the transmission line nature of real gate loops, and the internal time constants of the driver’s blocking capacitors.
Gate Driver Selection

- Values for example with FF450R17ME4
  - Blocking Voltage 1700V
  - Gate drive power $P=0.46\text{W}$
  - Gate current $\pm I_{\text{max}} = 3.7\text{A}$

- Driver selection
  - [https://gate-driver.power.com/](https://gate-driver.power.com/)
  - Home » Products » Product Finder
  - Driver core