DN1154

Use of DGD2106 in IR2106 Applications

Introduction

The DGD2106 is a high-side/low-side gate driver IC capable of driving 600V MOSFET/IGBTs and has been designed to be a pin for pin, functionally compatible, drop in replacement to the IRS2106. However, for applications using the older IR2106 there may need to be a small change of BOM to best match the gate driver response.

Differences between the DGD2106 and the IR2106

From the application perspective, the most significant differences in the specifications are rise/fall times and output current capability.

Symbol	Definition	DGD2106			IR2106			Units
		Min	Typ	Max	Min	Typ	Max	
IO+	Output high short circuit pulse current	130	290		120	200		mA
IO-	Output low short circuit pulse current	270	600		250	350		mA
tr	Turn-on rise time		100	220		150	220	ns
tf	Turn-off fall time		35	80		50	80	ns

Table 1: Specification Differences Between the DGD2106 and the IR2106

The DGD2106, being a faster gate driver IC than the IR2106, will turn-on and turn-off the MOSFET/IGBT more quickly. In some applications, this will translate to a more efficient system because of less switching losses. But in some driver circuits, the faster dV/dt and dI/dt could cause more overshoot, and potentially greater $-V_S$ undershoot, possibly causing a circuit to not function properly. Hence to use the DGD2106 in an IR2106 application with the aim of having a similar gate drive as the IR2106, the gate resistor would need to be increased to slow down the drive signal.

Matching the Rise/Fall Time

A typical gate driver half-bridge circuit can be seen in Figure 1. Often for the HO and LO gate drive a gate resistor is used (R_{GH} and R_{GL}). To increase rise/fall time, R_{GH} and R_{GL} are increased.

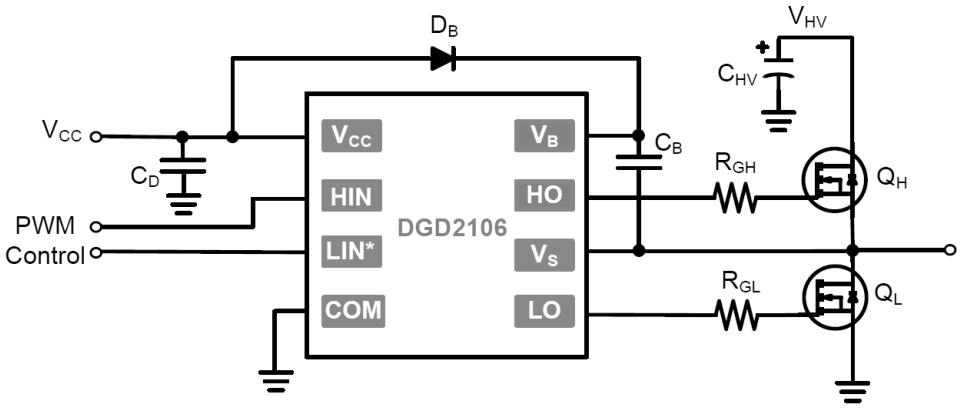

Figure 1: DGD2106 in a typical half-bridge circuit

To best match the DGD2106 in an IR2106 application, match the rise/fall time of the DGD2106 with that of the IR2106 in that application. To show an example, using the circuit similar to Figure 1 except instead of the MOSFETs as load to the gate drive signal, a load capacitor (C_L = 1000pF) was used.

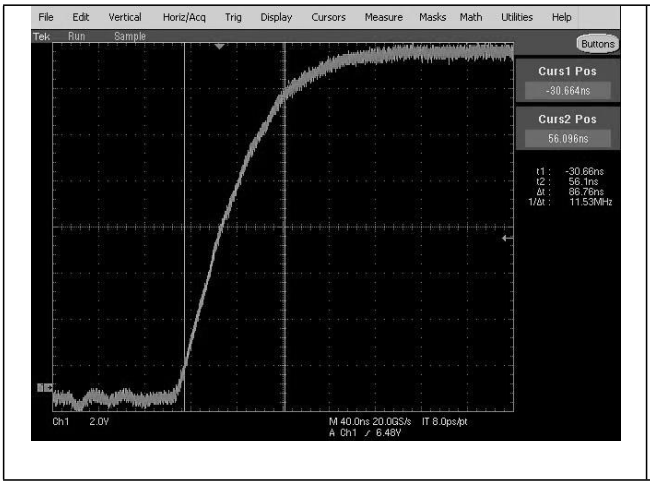

Figure 2: IR2106 with R_{GL} = 3Ω, tr = 86ns

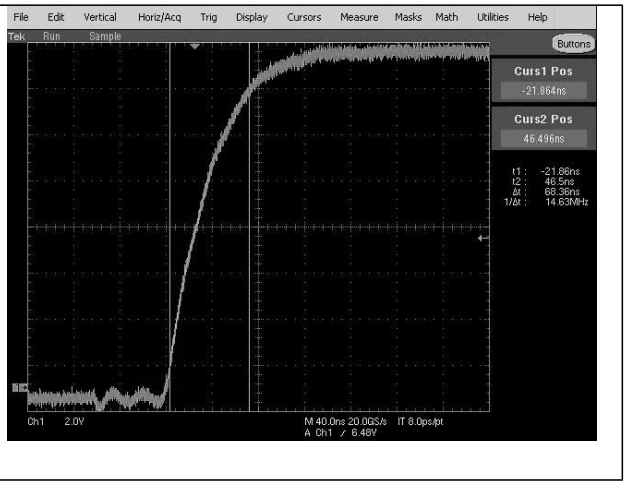

Figure 3: DGD2106 with R_{GL} = 3Ω, tr = 68ns

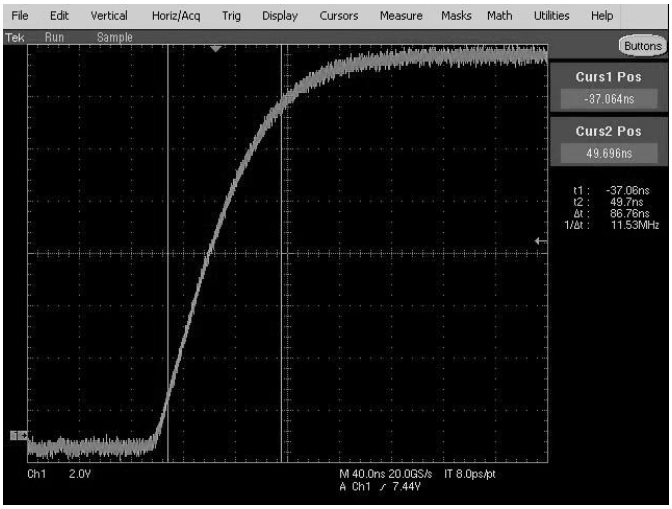

Figure 4: DGD2106 with R_{GL} = 100Ω, tr = 86ns

Hence, by making the gate resistors (R_{GH} and R_{GL}) larger you will have similar rise and fall times and will decrease the chances of any unwanted effects due to the higher dV/dt and dI/dt. In another driver circuit the value may be greater or less than 100 Ω, depending on initial gate resistor value and MOSFET gate capacitance.

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