



IGBT VS MOS In PFC Application

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A Successful Design in

- INPUT V: 103V/60HZ
- OUTPUT POWER: 300W
- BOOST DIODE: HFA15TB60
- PFC IC: ML4803
- PFC OUTPUT V: 13.5V
- PFC Freq. 67KHZ
- Original Solution: SPW20N60S5 (Cool MOS)
- Original Input power: 461W
- When apply the HGTG7N60A4D that the input power: 450W
- The performance of IGBT is better than SPW20N60S5.

Why (When) IGBT is better Than Cool MOS...

- When Pin is higher.
- When Switching Frequency is about 70K Hz or lower
- The Driver Voltage should be as close to 15 V as possible.

Switching Frequency Analysis

	$F_s = 70 \text{ K Hz}$	$F_s = 100\text{K}$
Impact to PFC O/P Capacitor	Can use smaller or cheaper Cap.	Should use better (more expensive) Cap.
Impact to PFC Chock	The same (when core selection is base on core loss) or should use bigger core .	Can use smaller Core (when core selection is base on core saturation) or the same.
Impact to EMI performance	Low Freq.: the 2 nd harmonic is lower than 150K Hz. High Freq: also better than $f_s=100\text{K Hz}$	Worse !

Switching Frequency Analysis

	$F_s = 70 \text{ K Hz}$	$F_s = 100\text{K}$
Impact to Efficiency	Better (no matter use MOS or IGBT)	Worse
Impact to Size	Except the core, other parts are the same (o/p Cap.) or smaller (heat sink)	Can be smaller, but need to use more expensive core, EMI filter, switching device...
Others	Lower cost	Higher Cost



Some things that are important...

- Qg of a IGBT is much less than an equivalent MOS → Increase Rg (try 10 Ohm first)
- Need to parallel a Small Diode to protect the IGBT