

Ultra-fast (W series) HF IGBTs



STMicroelectronics

New planar technology concept results in a tighter variation of switching energy (E_{OFF}) versus temperature

The new family of ultra-fast (W series) 600 V HF IGBTs improves the power efficiency in high-frequency equipment by minimizing turn-off energy losses mainly at frequencies up to 100 kHz.

The new series, which includes 35 A (STGWx35HF60WDx) and 45 A (STGWx45HF60WDx) devices, facilitates parallel connection for higher power levels as a result of the $V_{CE(sat)}$ classification. It also achieves up to 10% better performance in conduction and switching losses, and lower spread of dynamic parameters, even at high temperature compared to the previous generation products.

Key features

- High operating frequency (over 100 kHz)
- Improved switch-off energy spread versus increasing temperature
- Lower on-voltage drop
- Classified $V_{CE(sat)}$
- Anti-parallel diode tailored to the application

Key benefits

- E_{OFF} max value guaranteed at spec both for 25 °C and 150 °C
- Lower static power losses
- Easy parallel connection (refer to AN3161)
- Lower E_{ON} losses

Targeted applications

- Welding
- Induction heating
- Solar inverters
- UPS
- PFC
- Resonant converters



Both the innovative double-drift process and the advanced planar strip layout give the HF W series IGBTs extremely fast turn-off times with a minimal tail current, as well as stable behavior over temperature allowing the application to provide high efficiencies.



Application benchmark: half-bridge resonant induction cooker



Test specifications/conditions:

Input power = 3 kW,
 switching frequency = 26 kHz,
 plate current = 33 A_{RMS},
 T_{amb} = 23 °C,
 C_{snubbing} = 15 nF for each device,
 PF ≈ 0.5 (from the inverter side)

A co-packaged anti-parallel diode, provided with a double option (ultra-fast or low drop soft recovery), optimizes the overall performance in both hard switching (welding, UPS, photovoltaic, SMPS) and soft switching (induction heating, resonant converters) applications.

The devices are offered in both industry-standard TO-247 and long-lead TO-247 (higher power dissipation) packages.



STEVAL-ISW001V1: 2.5 kW double switch forward, 130 A arc welding MMA demonstration board based on the STGW35HF60WD

Ultra-fast HF IGBTs (W series)

| Part number | V _{CES} (V) | I _C @ 100 °C (A) | V _{CE(sat)} (V _{GE} = 15 V, T _J = 125 °C) | | E _{OFF} @ T _J = 125 °C (μJ) | P _{TOT} (W) | Package |
|----------------|----------------------|-----------------------------|--|----------------------|---|----------------------|-----------|
| | | | typ (V) | @ I _C (A) | | | |
| STGW35HF60WD | 600 | 35 | 1.65 | 20 | 350 | 200 | TO-247 |
| STGW45HF60WD | 600 | 45 | 1.65 | 30 | 550 | 250 | TO-247 |
| STGW35HF60WDI | 600 | 35 | 1.65 | 20 | 350 | 200 | TO-247 |
| STGWA35HF60WDI | 600 | 40 | 1.65 | 20 | 350 | 260 | TO-247 LL |
| STGW45HF60WDI | 600 | 45 | 1.65 | 30 | 550 | 250 | TO-247 |
| STGWA45HF60WDI | 600 | 50 | 1.65 | 30 | 550 | 310 | TO-247 LL |



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