

# San'an Gen3 1200V SiC Schottky Barrier Diodes

## Optimal Selection of High Efficiency and Compact System

### PB2024-D01 Product Brief



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San'an Semiconductor silicon carbide Schottky barrier diodes (SiC SBDs) fully exert the advantages of silicon carbide (SiC) compared to silicon. SiC SBDs can withstand higher voltage without breaking down and support higher temperature than silicon-based devices, and do not have reverse charge recovery. San'an's generation 3<sup>rd</sup> (G3) 1200V SiC SBD adopted advanced San'an's G3 SiC SBD fabrication technologies. Due to its prefect performance parameters (Forward voltage  $V_F$ ; Thermal resistance  $R_{th(j-c)}$ ), the diode has lower conduction loss and more effective heat dissipation capability, contributing to a more efficient and compact system design. San'an's G3 1200V SiC SBDs are RoHS compliant and can be used in industrial applications, and some products have qualified with AEC-Q101 standard for EV applications.

#### FEATURES

- High-reliability MPS structure
- Thin-wafer Platform
- Zero Reverse Recovery
- Lower  $V_F$
- Ultra High Switching Speed
- Optimized Thermal Management
- RoHS Certified



#### BENEFITS

- ✓ Improved System Level Efficiency
- ✓ Enables High Power Density Designs
- ✓ Reduced Cooling Requirements
- ✓ Enhanced System Reliability
- ✓ Provided High-speed Switching
- ✓ Preferred Replacement for the Generation 2<sup>nd</sup> (G2) 1200V SiC SBD

The G3 1200V SiC SBD adopts San'an's thin-wafer platform, as shown in Figure 1 to Figure 3. The G3 device decreases the wafer thickness by more than half, and this technology greatly optimized the  $V_F$  and heat dissipation capability of the device, and reduced the  $R_{th(j-c)}$  by about 17%.

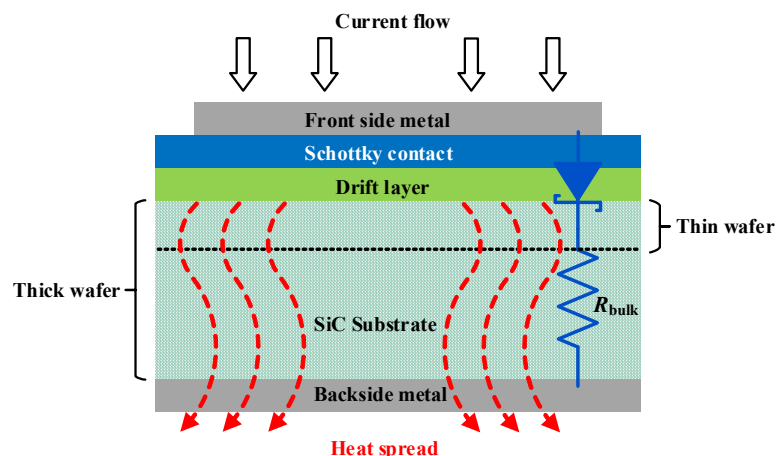
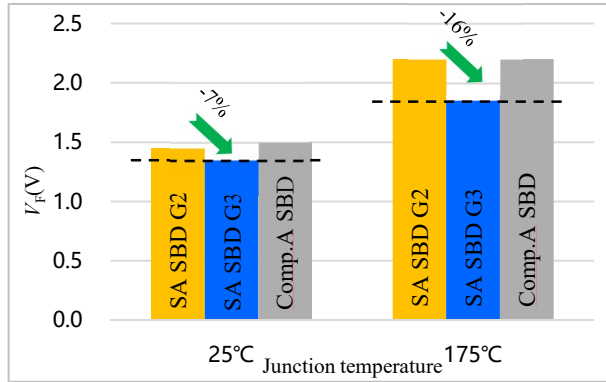
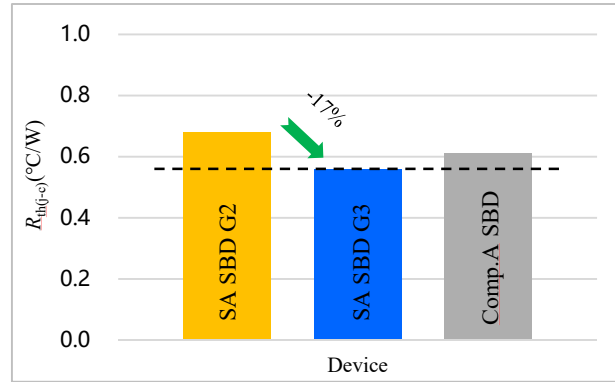


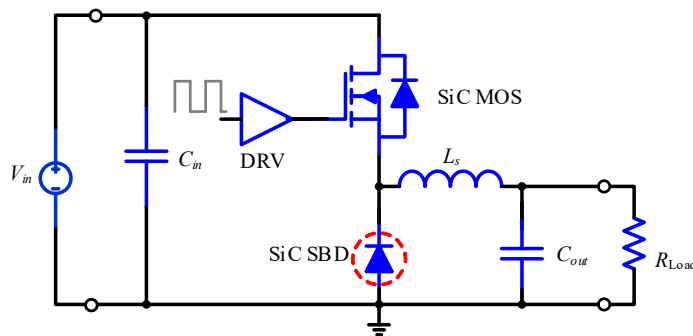
Fig 1: Schematic diagram of SiC SBD with thick wafer and thin wafer



Fig 2: Comparison of  $V_F$  (1200V 20A SiC SBD)Fig 3: Comparison of  $R_{th(j-c)}$  (1200V 20A SiC SBD)

The equivalent substrate resistance ( $R_{bulk}$ ) of SiC substrate will generate a voltage drop when the diode conducts, which is a critical part affecting the  $V_F$  of the diode. Thinner SiC substrate thickness stands for smaller internal resistance of the diode and lower forward voltage drop.

The power losses generated by diode during operation accumulate in the form of thermal energy inside the chip, which needs to be promptly and effectively transferred to the outside of the device to avoid device thermal run away due to high temperatures. Reducing the thickness of the SiC substrate can shorten the path for heat to reach the device's package case, thereby reducing the  $R_{th(j-c)}$  and greatly improving its heat dissipation capability. Figure 4 demonstrates the comparative test of SiC SBDs on the Buck converter, and the results are shown in Figure 5.



Buck circuit:

 $V_{in} = 800V$  $V_{out} = 160V$  $f_{sw} = 50kHz$  $T_a = 24.5^\circ C$ 

Fig 4: Buck topology setup to compare the performance impact of G2 and G3 SiC SBDs

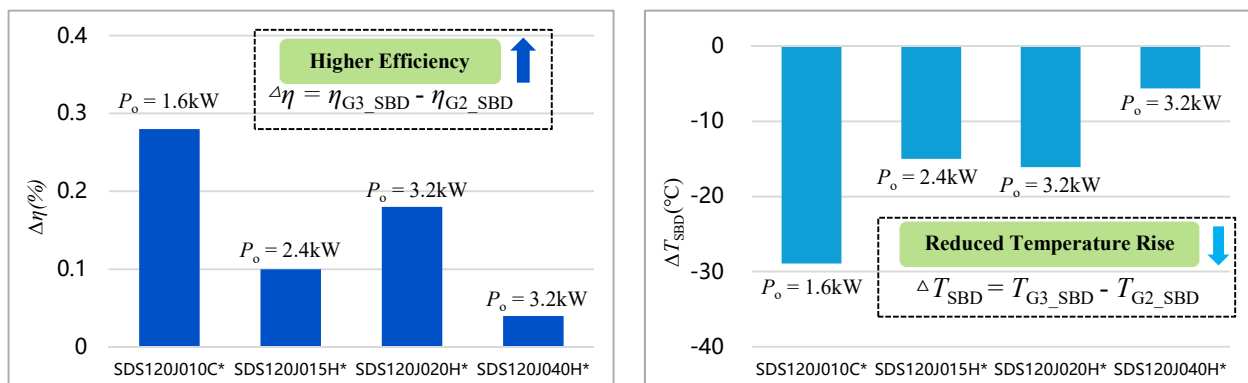


Fig 5: Comparison of efficiency (left) and temperature (right) of 1200V SiC SBD G3 and G2

The G3 SiC SBD optimizes the  $V_F$  of the diode based on the G2, minimizes its conduction loss, and enhances system power efficiency. The G3 SiC SBD has a smaller thermal resistance, immensely improving the device's heat dissipation capability, making the device more reliable and capable of supporting higher power field, and simplifying the heat dissipation design of application systems.



Sanan 1200V SiC SBD G3 Series



| I <sub>F</sub> (A) | TO220-2L     | TO247-2L     | TO247-3L     | TO252-2L     | TO263-2L     | Baredie      | SOT-227     | SMBF | SAPIG |
|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|------|-------|
| 2                  | SDS120J002C3 |              |              | SDS120J002D3 |              | SDS120J002B3 |             |      |       |
| 3                  |              |              |              | SDS120J003D3 |              | SDS120J003B3 |             |      |       |
| 5                  | SDS120J005C3 |              |              | SDS120J005D3 |              | SDS120J005B3 |             |      |       |
| 10                 | SDS120J010C3 | SDS120J010H3 | SDS120J010G3 | SDS120J010D3 | SDS120J010E3 | SDS120J010B3 |             |      |       |
| 15                 | SDS120J015C3 | SDS120J015H3 |              |              |              | SDS120J015B3 |             |      |       |
| 20                 |              | SDS120J020H3 | SDS120J020G3 |              |              | SDS120J020B3 |             |      |       |
| 27                 |              | SDS120J027H3 |              |              |              | SDS120J027B3 |             |      |       |
| 30                 |              | SDS120J030H3 | SDS120J030G3 |              |              | SDS120J030B3 |             |      |       |
| 40                 |              | SDS120J040H3 | SDS120J040G3 |              |              | SDS120J040B3 |             |      |       |
| 50                 |              | SDS120J050H3 |              |              |              | SDS120J050B3 |             |      |       |
| 60                 |              | SDS120J060H3 | SDS120J060G3 |              |              | SDS120J060B3 |             |      |       |
| 60*2               |              |              |              |              |              |              | SLS120J060A |      |       |
| 80*2               |              |              |              |              |              |              | SLS120J080A |      |       |
| 100*2              |              |              |              |              |              |              | SLS120J100A |      |       |

Industry application

| I <sub>F</sub> (A) | TO220-2L     | TO247-2L     | TO247-3L | TO252-2L     | TO263-2L | Baredie      | SOT-227 | SMBF    | SAPIG        |
|--------------------|--------------|--------------|----------|--------------|----------|--------------|---------|---------|--------------|
| 1                  |              |              |          |              |          | ADS120J001B3 |         | ADS12B3 |              |
| 5                  |              |              |          | ADS120J005D3 |          | ADS120J005B3 |         |         |              |
| 20                 | ADS120J020C3 | ADS120J020H3 |          |              |          | ADS120J020B3 |         |         |              |
| 50                 |              |              |          |              |          | ADS120J050B3 |         |         | ADS120J050V3 |

Automotive application

More Series Coming Soon...  
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