New Release

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SiC MOSFETs(1200V) : Chinese-made SiC MOSFETs Benchmark Report (2025 Edition)

Introduction

Due to the improved quality, yield and lower cost of SiC wafer produced in China, worldwide leading SiC MOSFET manufacturers have begun adopting wafers from Chinese companies. The number of SiC power device manufacturers in China has expanded, reaching close to 100 companies. It is anticipated that the adoption of Chinese-made power devices in various products will rapidly increase in the near future.

In recent years, we have observed that some of these products exhibit performance on par with those of leading global manufacturers. Therefore, we believe it is essential to regularly assess the technical level of Chinese SiC MOSFETs, just as we do for the major manufacturers.

Report abstract

LTEC has conducted structural/material and electrical characteristic analyses on approximately 60 SiC power devices from 2014 to 2025, as well as on 9 Chinese-made SiC power devices since 2021. In this report, the technology trends of Chinese manufacturers are summarized and compared with that of major global SiC manufacturers. (See P.3)

Product features

Manufacturer	Gen	Product	Vds[V]	Id[A]	Ron[mΩ]
BASIC	Gen2	B2M065120Z	1200	47	65
INVENTCHIP	Gen2	IV2Q12040T4Z※1	1200	65	40
INVENTCHIP	Gen3	IV3Q12013T4Z	1200	147	13.5
Hestia	Gen2	H2M120F080	1200	33	80
Sanan	Gen2	SMS1200075M2	1200	35	72

※1 Only simple structural analysis performed

Report contents (61 pages) and Summary of results

・Some Chinese manufacturers have emerged with FOM RONxAA that is comparable to or exceeds third-generation products from leading global manufacturers.

・The thickness of the epitaxial and buffer layers in all evaluated SiC MOSFETs is very similar, indicating possible commonality in SiC substrates, epitaxial layers, and buffer layers.

・Although the impact on reliability wasn't evaluated, based on structural shape abnormalities some manufacturing concerns are observed in several products.

・Cost analysis results suggest that the cost of Chinese-made devices is expected to be significantly lower than that of global manufacturers.

Report price

Delivered one week after order placement.

Please contact us for report pricing.

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3. Benchmarking electrical characteristics

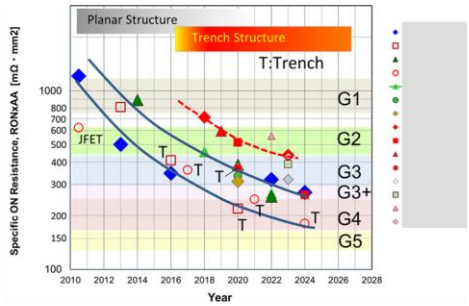
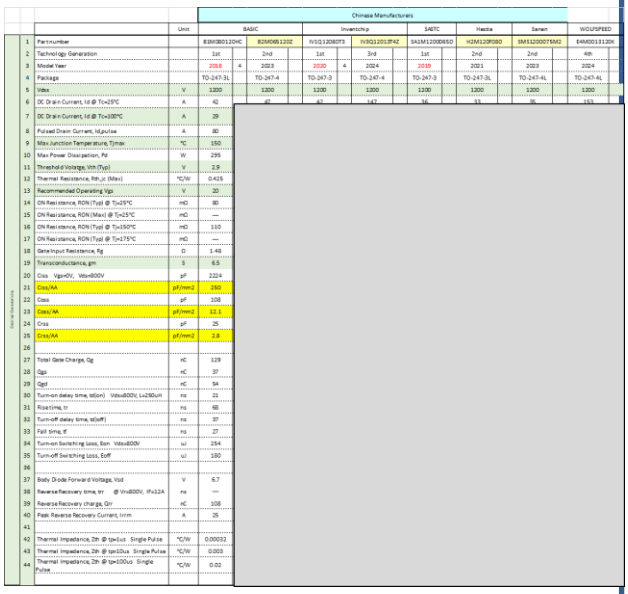


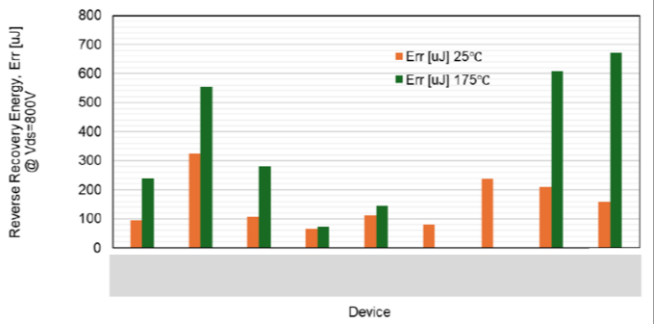
Fig. 1-6-1 Trend of ON resistance per area (RON x A)

★This graph shows the analysis data we conducted from 2015 to 2024.

1) The bottom line represents the major SiC device manufacturers (I) → RONxA is the lowest
2) The middle line is a trend that includes minor manufacturers (
3) The red dashed line shows the trend of Chinese manufacturers → Before 2023, it was clear that Chinese manufacturers were lagging behind in technology, but after 2023, some manufacturers such as and are catching up with major manufacturers.



		Unit	Chinese Manufacturers								
			BASIC		Inventchip		SASTC	Hestia	Sanan	WOLFSPEED	
	Part number		B1M080120HC	B2M065120Z	IV1Q12080T3	IV3Q12013T4Z	SA1M1200065D	H2M120F080	SMS1200075M2	E4M0013120K	
	Technology Generation		1st	2nd	1st	3rd	1st	2nd	2nd	4th	
Device Structure	47 Chip Size, X x Y	mm x mm	3								
	48 Chip Size, A =X x Y	mm2									
	49 Transistor Active Area, AA	mm2									
	50 Chip Edge (Uneffective) width, We	mm									
	51 FOM 1：単位面積当たりON抵抗, RONxAA	mΩ・mm2									
	52 FOM 2: RONxQg	Ω・nC									
	53 MOSFET Total Channel width, W	mm									
	54 Transistor cell structure										
	55 Transistor cell array configuration										
	56 Transistor cell Pitch, P	μm									
	57 Tox	nm									
	58 N-Epi thickness	μm									
	59 Chip Thickness, dsic	μm									



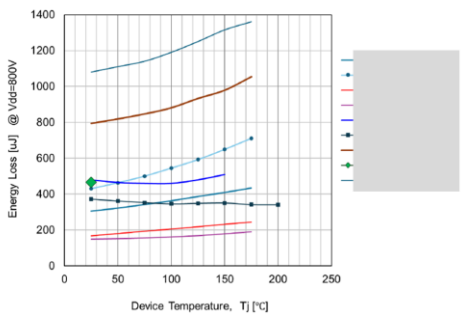
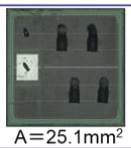
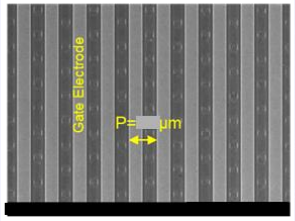
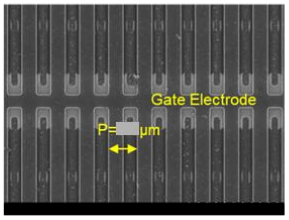
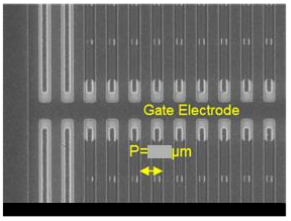
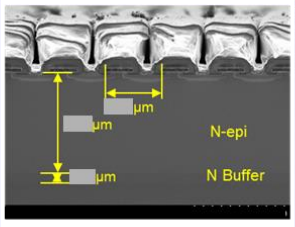
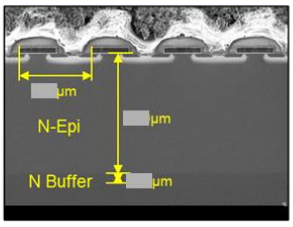
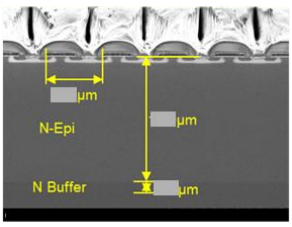
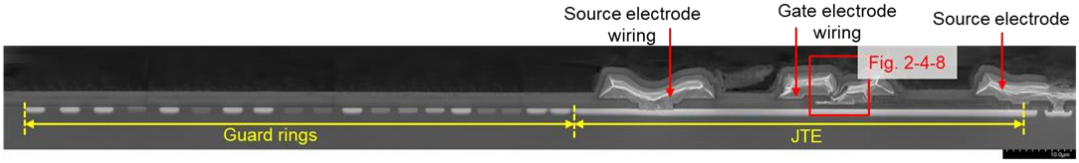


Fig.X-1 Body diode reverse recovery energy losses (Err @ 25℃, 800V), and (b) total switching energy loss in 1200V, Ron~32-40mΩ SiC MOSFETs.

	BASiC	Inventchip	Inventchip
Product	B2M065120Z	IV2Q12040T4Z	IV3Q12013T4Z
Die photograph	 A=10.0mm²	 A=12.8mm²	 A=25.1mm²
Transistor cell Plane SEM: Array configuration			
Transistor cell Cross-sectional SEM: Epi layer			

Manufacturing Concerns（3）（Sanan：SMS1200075M2）



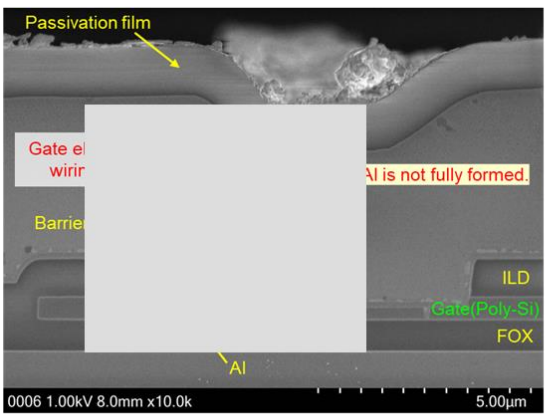


Fig. 2-4-8 Outer periphery: Cross-sectional SEM image

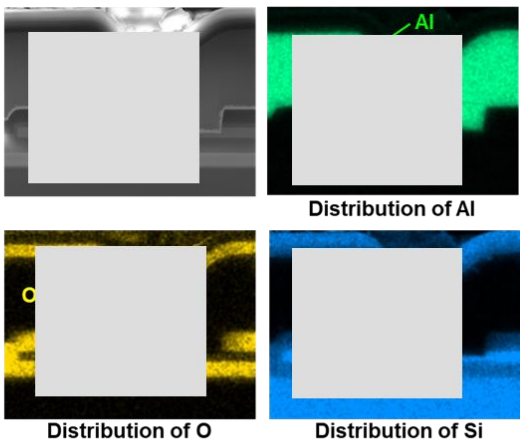


Fig. 2-4-9 SEM-EDX mapping