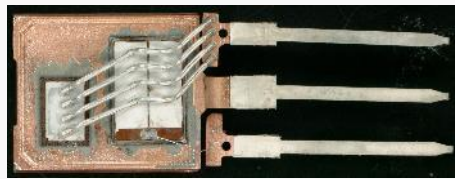
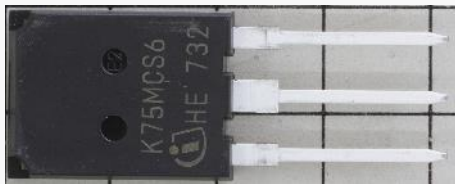
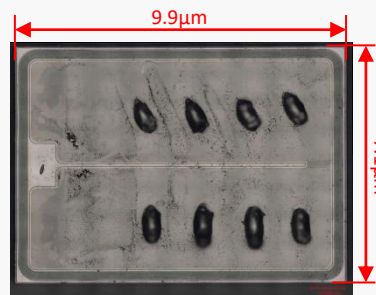


INFINEON IGBT6(IKQ75N120CS6XKSA1) STRUCTURE ANALYSIS REPORT

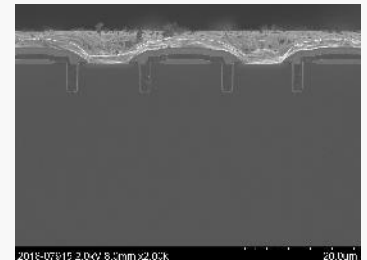
January 2018. LTEC Corporation released a detailed structure and process analysis report of the latest generation 1200V IGBT high speed device from Infineon. The previous version of this device is IGBT4. It is announced that this is the first power device produced in 12 inch Si wafer.



Package



Die image



SEM-Cross section

Analysis result summary

1. The gate oxide film is thinner by 14% in order to improve the transconductance compared with the previous generation IGBT4 (1200V high speed 3).
2. The whole transistor cell pitch is reduced by about 9%.
3. The performance of $V_{ce(sat)}$, turn-on switching loss power and transconductance are improved.

The report has two individually purchasable sections: a 106-page Structure Analysis Section, and a 28-page Process Analysis section. The Structure Analysis Section reveals the physical construction of the device, including EDX materials analysis, and many other fine details. The Process Analysis Section includes manufacturing process flow and the estimated number of photo masking steps.

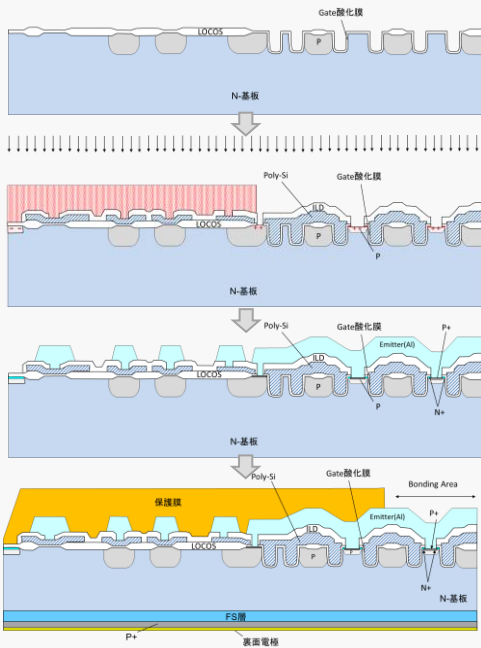
Contact LTEC Corporation for the current price as it decreases over time

18G-0017-1

Comparison table(IGBT4(HighSpeed3),IGBT5 &IGBT6)

		IGBT4 (HighSpeed3)	IGBT5	IGBT6
Part Number	Unit	IKQ75N120CH3	FF1200R12IE5	IKQ75N120CS6X
Transistors per Switch		1	8	1
Die size [mm xmm]		11.4x7.0	15.6 x7.8	9.9x7.1
Die size	mm ²	79.93	121.7	69.72
Electrical Characteristics				
Collector-emitter voltage	V	1200	1200	1200
DC collector current Tc=25°C	A	150	-	150
DC collector current Tc=100°C	A	75	150 ※Tc=80°C	75
Nominal Current Density Ic/A Tc=25°C	A/mm ²	1.9	-	2.2
Nominal Current Density Ic/A Tc=100°C	A/mm ²	0.94	1.2 ※Tc=80°C	1.1
Max Operating Temperature Tjop	°C	175	175	175
Collector-emitter saturation voltage Tc=25°C	V	2	1.7	1.85
Gate threshold voltage Vth	V	5.8	5.8	5.7
Input capacitance	pF	4856.0	8187.5	4900.0
Output capacitance	pF	505.0	-	360.0
Reverse transfer capacitance	pF	290.0	325	225.0
Transconductance	S	26.0	-	60.0
Turn-on delay time, inductive load tdon	us	0.034	0.2	0.034
Rise time, inductive load	us	0.047	0.16	0.044
Turn-off delay time, inductive load	us	0.282	0.48	0.3
Fall time, inductive load	us	0.029	0.08	0.031
Turn-on energy loss per pulse per IGBT Eon/N/A	mJ/mm ²	0.080	0.08	0.074
Turn-off energy loss per pulse per IGBT Eoff/N/A	mJ/mm ²	0.035	0.13	0.042
Short-Circuit Current per IGBT Isc/N/A	A/mm ²	-	4.1	-
Normalized Thermal resistance, junction to case IGBT	°C·mm ² /W	-	27.9	-

INFINEON IGBT6 manufacturing process sequence



Mask	Process step	Comment
	Wafer	Si FZ N-type substrate N(~50-60Ωcm)
[1]	AM Ph 1 st oxide	arks
[2]	PD·GF	
	P(11B Anneal CVD S	
[3]	FOX P SiN/SiC FOX O SiN·O	
[4]	TR Phc TR Si ε TR Oxi	ate Oxide
[5]	PolySi GP Ph PolySi GP Ma	
[6]	PCH P	k
[7]	PW Ph	
[8]	Pwell(1 Anneal CP Phc	
[9]	P(11B- N+ Photo/mask	N + Source diffusion



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		IGBT4 (HighSpeed3)	IGBT5	IGBT6
Part Number	Unit	IKQ75N120CH3	FF1200R12IE5	IKQ75N120CS6X
· Transistors per Switch		1	8	1
Die size [mm xmm]		11.4x7.0	15.6 x7.8	9.9x7.1
Die size	mm2	79.93	121.7	69.72
Electrical Characteristics				
Collector-emitter voltage	V	1200	1200	1200
DC collector current Tc=25°C	A	150	-	150
DC collector current Tc=100°C	A	75	150 ※Tc=80°C	75
Nominal Current Density Ic/A Tc=25°C	A/mm2	1.9	-	2.2
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Short-Circuit Current per IGBT Isc/N/A	A/mm2	-	4.1	-
Normalized Thermal resistance, junction to case IGBT	°C·mm2/W	-	27.9	-

12.8

11.8

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