New Release

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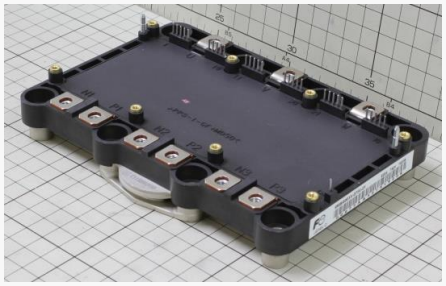
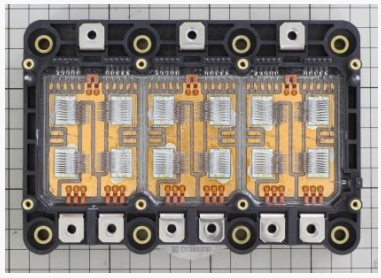
FUJI ELECTRIC '6MBI800XV-075V-01' IGBT MODULE FOR EV & HEV DETAILED ANALYSIS REPORTS

July 2019. LTEC Corporation released three reports (Module structure report, IGBT chip structure report & process flow and electrical characteristic report) of Fuji Electric IGBT module. This module is for automotive application, Vces=750V, Ic=800A. The IGBT chip is the 7th generation X series RC-IGBT (Reverse Conducting IGBT).



Module



Module inside

IGBT die image

Report contents

(1) The module analysis report confirms the internal configuration of the module and reveals the layout of the RC-IGBT. In addition, we have clarified the structure and internal configuration of the cooler to estimate the heat removal mechanism.

(2) The planar layout, cross section and EDX of RC-IGBT IGBT and FWD regions are included in the IGBT chip structure analysis report.

(3) In the process analysis report, we consider the process technology of RC-IGBT, estimate the number of masks and the manufacturing process flow. The integration of the IGBT, the FWD and temperature sensors are revealed.
We measure Ic-Vce characteristic, off-state collector leak current and breakdown voltage respectively, and extract the activation energy from temperature dependency of off-leak current. Furthermore the comparison with Infineon IGBT7 is also included.

Structure analysis report: (1)Module $3,500 / (2) IGBT chip $5,800
(3) Process and electric characteristic analysis report: $4,600

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

19G-0004-1

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Table of Contents
Module structure analysis report

	Page
Device summary	
Table 1, Executive Summary	3
Analysis overview	4
Table 2. Module structure overview	6
Module overview	7
Module structure	11
Cooling structure	**23**
Module cross-section analysis	
Cross-section	34
EDX analysis	62
Reference patents	83

Table of Contents
IGBT chip structure analysis report

	Page
Device summary	
Table 1, Executive Summary	3
Analysis results	4
Table 2. Die structure: Si IGBT	8
Table 3. Die structure: Si FWD	9
Table 4. Die structure: Layers, materials, and thicknesses	10
Die overview	11
Analysis details	
Plain view (OM)	26
Plain view (SEM)	79
Cross-section	109
EDX analysis	147
Others	157

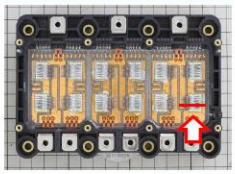
Table of Contents
Process and electric characteristic analysis report

	Page
Executive summary	**3**
Analysis summary	3
Comparison with Infineon IGBT7	5
RC-IGBT Die analysis	**7**
Die	8
Die edge	9
Cell array plain view	10
Die analysis details	
Die back side structure (plain view & cross section)	18
Die edge (plain view & cross section)	19
Cell plain view	20
Cell cross section	23
Trench	24
Temperature sensor diode	26
Process flow (estimation)	**28**
Electric characteristic	**40**
IC-Vce	43
Off state collector current vs & voltage	45
Off state IC vs Vce and temperature	46
Off state breakdown voltage	47
Off stage leakage current comparison with Infineon IGBT7	48
Appendix	
References	50
Patents	51

●Excerpts from the module structural analysis report (1)

モジュール断面構造分析

富士電機
6MBI800XV-075V-01



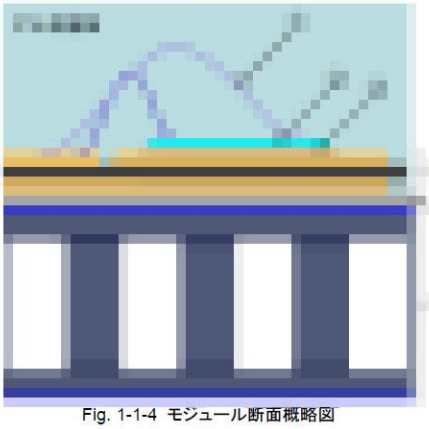
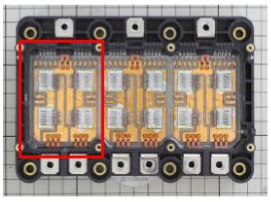


Fig. 1-1-4 モジュール断面概略図

表2：モジュール断面構造概要

	測定箇所		測長結果	材料
1	ワイヤ			
2	IGBT			
2-1		表面保護膜		
2-2		配線層		
2-3		基板		
2-4		裏面電極-1		
2-5		裏面電極-2		
3	ダイアタッチ			
4	基板（AMC）			
4-1		上部金属層		
4-2		ろう材		
4-3		絶縁層		
4-4		添加物		
4-5		ろう材		
4-6		下部金属層		
5	半田			
6	冷却器			
6-1		メッキ		
6-2		ベース板		
6-3		ろう材		
6-4		フィン		
6-5		ろう材		
6-6		ジャケット		
6-7		メッキ		

3-1. モジュール内部観察



X方向寸法

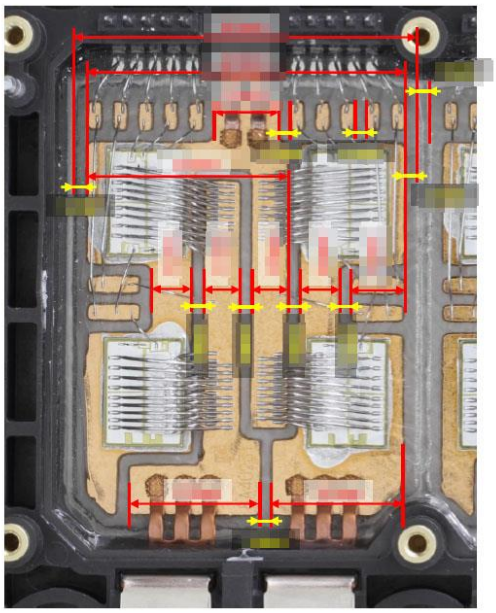


Fig. 3-1-6 モジュール内部拡大

●Excerpts from the module structural analysis report (2)

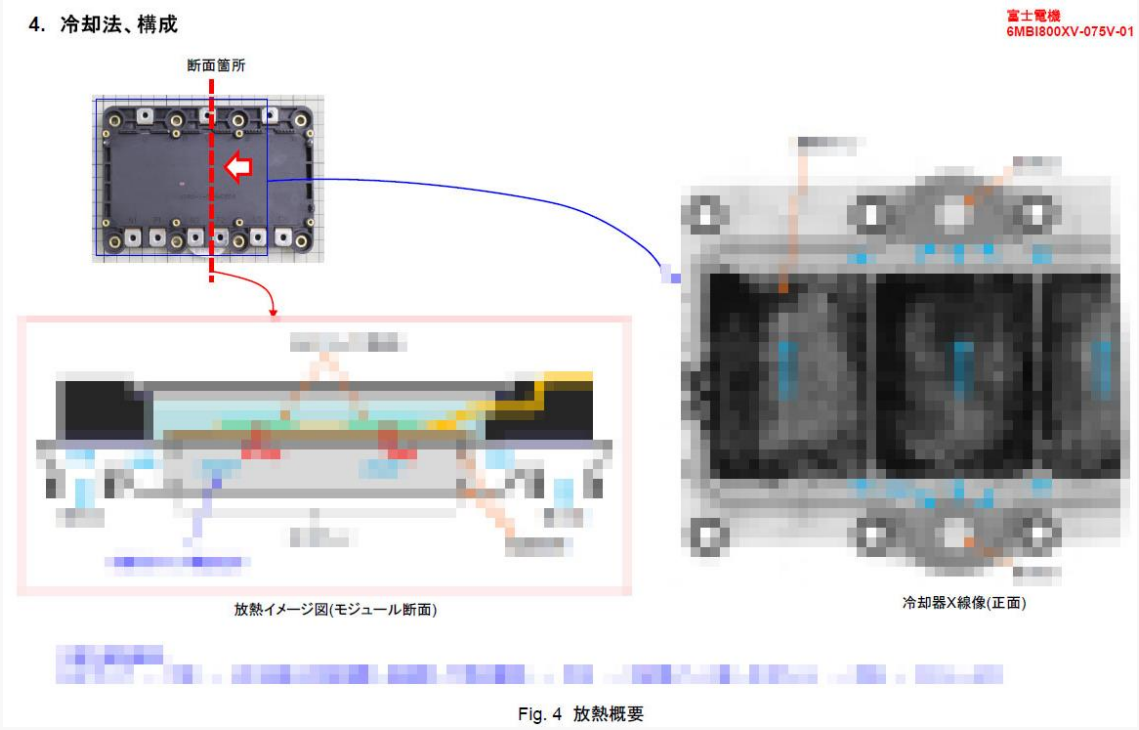
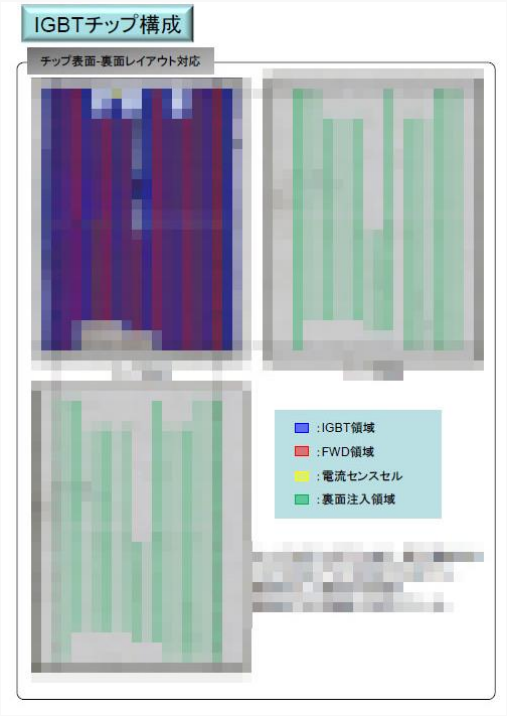
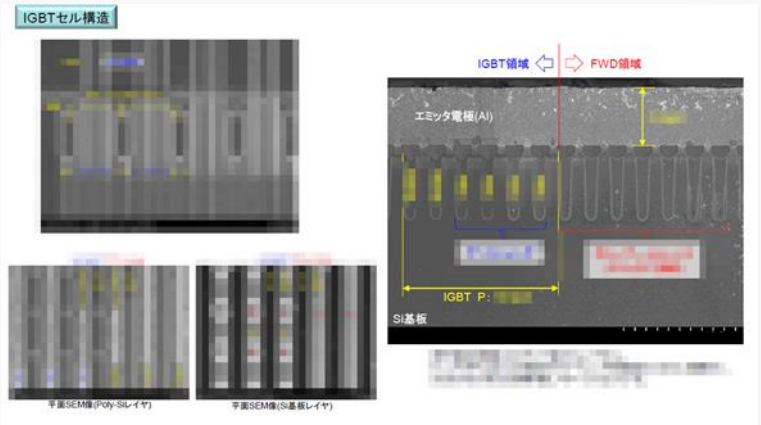


Fig. 4 放熱概要

Fig. 4-1-4 冷却器断面OM像

●Excerpt from die structure analysis report





3-3. 断面構造解析(SEM)

セル部断面まとめ

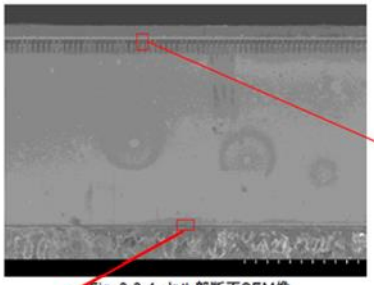


Fig. 3-3-4 セル部断面SEM像

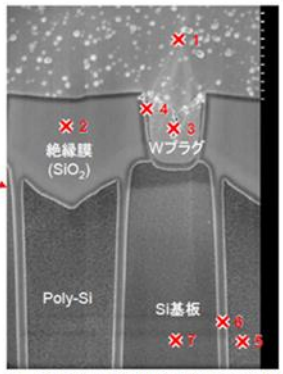
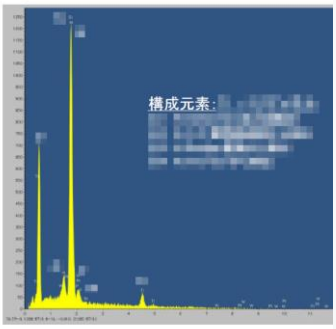


Fig. 3-3-6 セル部断面SEM像(IGBT領域)



SEM-EDX結果

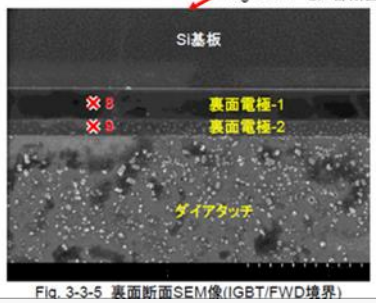
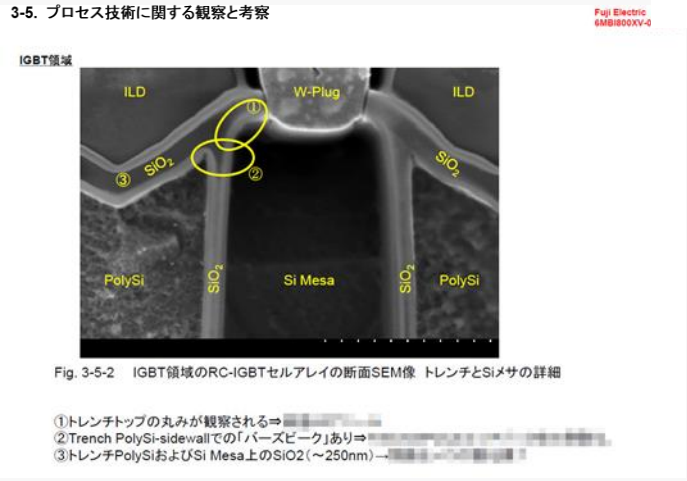


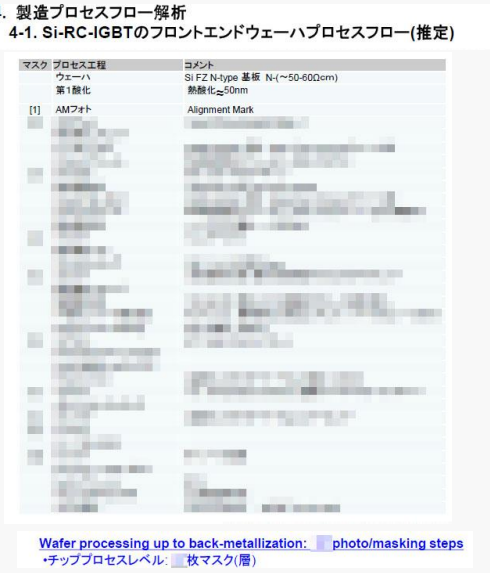
Fig. 3-3-5 裏面断面SEM像(IGBT/FWD境界)

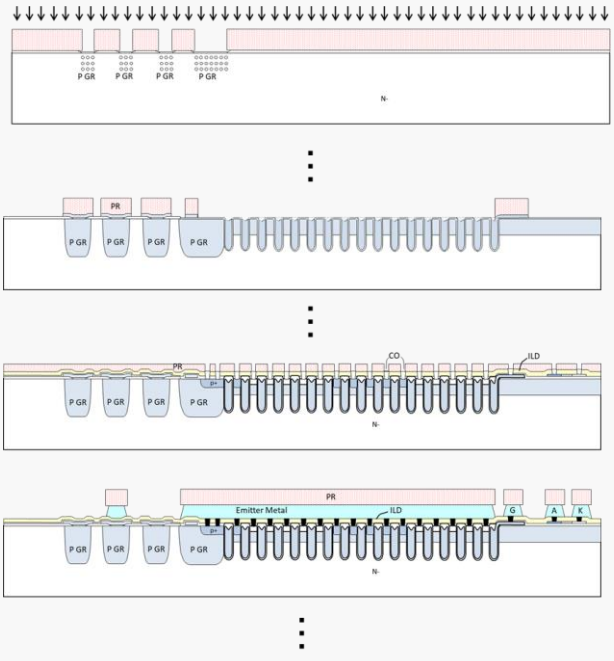
Table. 3-3-1 セル部 各層膜厚/EDX分析結果 ※モジュール構造解析レポート参照

	測定箇所	測長結果	材料
	IGBT		
	保護膜※		
1	表面電極		
2	層間絶縁膜		
3	コンタクトプラグ		
4	バリアメタル		
5	Gate電極		
6	Gate絶縁膜		
7	基板		
8	裏面電極-1		
9	裏面電極-2		

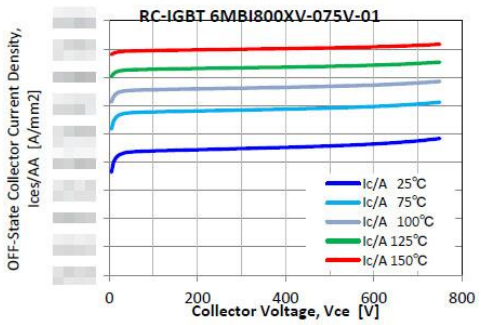
●Excerpts from process and device characterization report

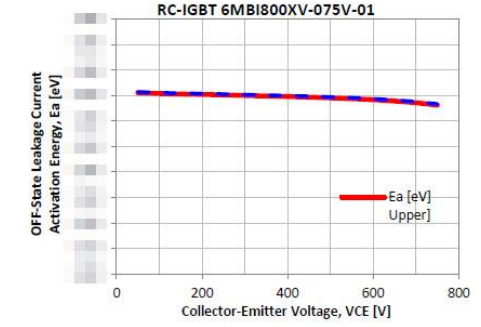






Process flow sequence diagram





Off-state collector leakage current per unit area and extraction of the activation energy