

IEEE MILESTONE "Inverter Air Conditioner Split Type,1980-1981"

Materials supporting the proposal

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No	Type	Title	Source	Publisher	Author	Year	Quoted Paragraph
1	Academic Journal Article	The First "One Step on Electro-Technology" Prize by the IEEJ Inverter Air Conditioner 第1回電気技術顕彰「でんきの礎」 インバータエアコン	The Journal of the IEEJ, Vol 129-2 p. 79,76,77 電気学会誌 2009年6月、第129巻2号 (Japan)	Institute of Electrical Engineers of Japan (IEEJ)	Institute of Electrical Engineers of Japan; IEEJ	2009	Summary ---Page79 Toshiba launched its inverter air conditioners for commercial use and residential use in December 1980 and December 1981, respectively. 概要説明 インバータエアコンと言えば、今は当たり前のようにになっているが、東京芝浦電気(株)(現東芝キヤリア(株))が、世界で初めて開発した画期的な電気技術によって商品化されたものである(業務用：1980年12月、家庭用：1981年12月発売)。
2	Academic Journal Article	Capacity Control with Frequency Modulation System 周波数変換による容量制御	"REFRIGERATION", June 1981 Vol. 56, No. 644 Japanese Association of Refrigeration 冷凍 1981年6月、第56巻644号 (Japan)	Japanese Association of Refrigeration (as known as the Japan Society of Refrigerating and Air Conditioning Engineers (JSRAE) today)	Kenji Iida, Toshiba Corporation	1981	Summary ---Page36 Toshiba is the first manufacturer that achieved the development and commercialization of a commercial air conditioner serving both cooling and heating purposes with a built-in unit of inverter and a variable-speed compressor (Custom Air Conditioner RAV-46HT), resulting in a significant improvement in energy efficiency and comfort. 概要説明 東芝は冷凍空調機としては初めて本装置と回転数可変新形圧縮機を組込んだ業務用冷・暖房機(カスタムエアコン・RAV-46HT)を開発実用化し、大幅な省エネルギーと一歩進んだ快適性を得ることが出来た。
3	Laboratory Report	Japanese Power Electronics Inverter Technology and Its Impact on the American Air Conditioning Industry	Contract DE-AC06-76RLO 1830 / US Department of Energy (USA)	Pacific Northwest National Laboratory for U.S.Department of Energy *2: Pacific Northwest National Laboratory (PNNL) is one of the United States Department of Energy national laboratories, whose main campus is situated in Richland, Washington. Pacific Northwest National Laboratoryは米国エネルギー省が運営する研究機関	Ushimaru, Energy International, Inc. Wilfert, Pacific Northwest National Laboratory	1990	2.2.3 Benefits of Capacity Modulation on Seasonal Efficiency for Heat Pumps ---Page2.4 4.7 Impact of foreign competition ---Page4.16 5.1 Overview ---Page5.1 5.3 First Inverter-driven Heat Pump ---Page5.3 to 5.4 7.0 Conclusions ---Page7.1
4	Industry Newspaper Article	Capacity modulation for air conditioning and refrigeration systems	Air Conditioning, Heating & Refrigeration News (USA)	BNP Media Inc. (Business News Publishing Co.)	Muir, Griffith Copeland Corporation	1979	"Variable speed motors" Cost of controls and the development time required have eliminated it from further consideration in this study, although the costs are dropping rapidly with new technology with may make this approach more viable in the near future.
5	Internal Engineering Periodical Article	Energy Saving by Compressor Capacity Control of Air Conditioners 空調機の能力可変化による省エネルギー	Toshiba Review Vol. 36, No. 9 p.p.849-852 東芝レビュー (Japan)	Toshiba Corporation	Kuroda and Kitagaki, Toshiba Corporation	1981	Summary ---Page849 In recent years, the industry has come to make efforts to develop compressors and air conditioners driven by inverters. Taking the lead in the world, Toshiba has succeeded in practicalizing this type of air conditioners(RAV-46HT); the new products have been put on sale since last December. 概要説明 近年になって業界はインバータ駆動圧縮機・空調機の開発に努力している。当社はこの空調機を世界に先がけて商品化に成功し、昨年12月から発売している(RAV-46HT)。
6	Internal Engineering Periodical Article	Air Conditioners Incorporating Variable-Capacity Control Inverter インバータ搭載能力比例制御エアコン	Toshiba Review Vol. 37, No. 7 p.p. 635 - 638 東芝レビュー (Japan)	Toshiba Corporation	Ide, Shimma,Sugiyama, Toshiba Corporation	1982	Summary ---Page635 A new type of airconditioner incorporating a variable-capacity-control inverter to improve energy saving and comfort has been developed as a pioneer for domestic use. 概要説明 家庭用冷暖房エアコンの省電力、快適性向上を図るため、家庭用では業界で初めてのインバータ搭載能力比例制御エアコンを開発した。
7	Industry Association Report	World AC Market & Inverter Ratio エアコンの出荷台数とインバータ比率	-	-	Toshiba Carrier Corporation Source; The Japan Refrigeration and Air Conditioning Industry Association	2019	Summary World AC Market: approx. 111 million units in 2018; 5.9% CAGR (2009-2018)