

Double Check Thermal Solutions

**High Efficiency Thermal
and Thermoelectric
Technologies**

Double Check

- We specialize in the development, design, engineering and manufacturing of thermal solutions and products for numerous industrial and commercial applications.
- Our products are a break-through in thermal management utilizing innovative high-efficiency solutions based on **Thermoelectric technology** and its combination with other thermal technologies: **Heat Pipes, Vapor Chambers, Phase Change Materials.**

About Double Check

- Double Check is Israeli private company
- Owners: Isaac Steiner and Alex Gurevich
 - Mr. Isaac Steiner – CEO, entrepreneur and investor.
 - Dr. Alex Gurevich – CTO, 30 years experience in the field of thermal management and thermoelectric solutions.
- Main customers: Israel Aerospace Industries, Lumenis, Hutchinson, Flex, Elbit

Performance of the Optimized Systems Developed by Double Check

- High COP of **1.0 - 1.2** for air cooling systems
- Temperature difference as high as **80 °C** for multistage system and **47 °C** for single stage cooling system
- Cooling power of **1 kW** or higher in accordance with customer requirement

Performance	COP	Temperature difference Single stage, °C	Temperature difference Multi stage, °C
Double Check	1.2	47	80
Other manufacturer	0.5	40	50

High Efficient Thermoelectric Modules

- We are developing New Generation of Thermoelectric Modules with high performance for the both Cooling and Power Generation applications:
 - Optimized thermoelectric material providing figure of merit Z 20% - 30% higher than regular material
 - Special structure of thermoelectric legs providing performance improvement up to 30%
 - Innovative special design of substrates providing performance of 20% relatively to the regular modules.
- Total Performance enhancement of about 50%.

Double Check Products: Thermoelectric Cooling Heating System for Environmental Testing

- Designed for environmental test of electronic components and assemblies in temperature range of **-60 °C to 130 °C**
- Based on combination of Thermoelectric and Compressor technologies
- Compact design: **size is less than 50% of the size of regular system based on dual compressors.**
- Can be used in clean room



Double Check Products: Thermoelectric Cooling/Heating System for Food and Drugs Transportation

- Temperature range: **2 °C at Cooling Mode, 74 °C at Heating Mode**
- Ambient air temperature: 38 °C maximum
- Internal volumes: **250L, 300L, 500L, 600L, 900L**
- Power supply: **100VAC-250VAC, 12VDC with battery backup option**
- Meets requirements of NSF and UL standards

Drugs transportation cabinet

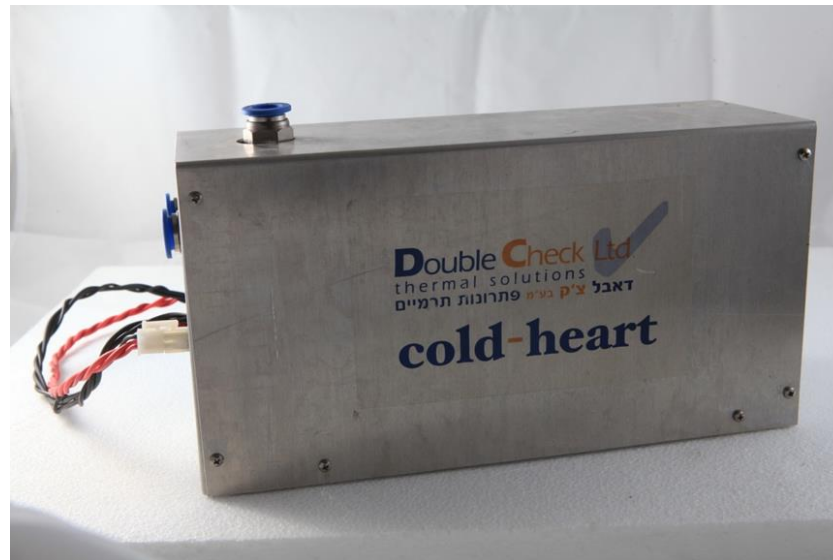


Food transportation cabinet



Double Check Products: Compact Personal Air Conditioner for Encapsulated Protective Suit

- The **Air Conditioner for Encapsulated Protective Suit** is made by combination of Thermoelectric and PCM technologies.
- Supplies chilled air temperature of **25 °C - 27 °C without heat dissipation outside the unit.**
- Can operate autonomously during time period of **1 hour** using high capacity rechargeable Li-Ion batteries enclosed.



Double Check Products: Thermoelectric Air Temperature Stabilizer for Semiconductors Process Cabinet

- The **Thermoelectric Air Flow Temperature Stabilizer** is designed to supply air to Cabinet with temperature accuracy of ± 0.1 °C
- Provides uniform and stabilized air flow of 750 CFM
- **Cooling Power: 480 W, Power Consumption: 450 W, COP=1.07**



Double Check Products: Thermoelectric Air Conditioner for Portable Electronic Enclosure

- The **Thermoelectric Air Conditioner** is designed for cooling of Portable Electronic Enclosure.
- Maintains inside the enclosure temperature of $45 \pm 5^\circ\text{C}$ at power dissipation of 550 W
- **Provides cooling power of 550 W, COP = 1.0**



Double Check Products: Thermoelectric Cooling System for Power Cables in Underground Tunnels

- The **Thermoelectric Cooling System** is designed for temperature control of high power electric cables in underground tunnels
- Maintains inside the tunnel temperature below 35 °C at power dissipation of 250 W/m.
- Provides efficiency **COP = 1.0**



Double Check Products: Low Temperature Refrigerator (under development)

- **Low temperature freezing for air temperature of -50 °C**

Solution is based on combination of vapor compressor and thermoelectric technologies.

Use of special Thermoelectric Modules optimized for the operation conditions that are developed by Double Check improves efficiency (COP) of the cooling system on 43% relatively to the system based on the regular Thermoelectric Modules.

Solution	Refrigerant temp, °C	Cold air temp, °C	Cooling power, W	Power consumption, W	COP
Double Check	-30	-50	20	29.7	0.67
Regular	-30	-50	20	42.6	0.47

Prospective Fields for Application of Double Check Technology in the Field of Refrigeration

- **Supercooling compartment in home refrigerator**
- **Wine Cellars**
- **Water Coolers**
- **Mini Bars**
- **Dehumidifiers**
- **Personal air conditioners**

**WE WILL BE HAPPY TO MEET WITH
YOU AND DISCUSS NEW
APPLICATIONS**

THANK YOU