



***Raising standards for consumers***

## TECHNICAL STUDY

Measurement of surface temperatures of a selection of products in the Scope of IEC 60335-2-9  
'Household and similar electrical appliances - Safety - Part 2-9: Particular requirements for grills, toasters and similar portable cooking appliances'



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## INTRODUCTION

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### **Measurement of surface temperatures of a selection of products in the Scope of IEC 60335-2-9 Household and similar electrical appliances - Safety - Part 2-9: Particular requirements for grills, toasters and similar portable cooking appliances**

This report provides **thermal (IR) images of 10 different small electrical cooking appliances** that were being heated in a manner similar to the test conditions of IEC 60335-2-9 Edition 7.0 2019-05, *Particular requirements for grills, toasters and similar portable cooking appliances*, the current published international safety standard for these types of appliances.

The images were commissioned to support further development of the 60335-2-9 standards where:

- at the EU level, there are ongoing concerns expressed by Member States' authorities that temperature limits in the current standard are too high.
- at the IEC level, there have been challenges raised by stakeholders on the blanket use of the doubling temperature relaxation (widely referred to as "note b" by standards developers).


The tests conducted were not a replication of those specified in that standard because temperatures were not measured using the Probe for measuring surface temperatures specified in Figure 105 of that standard.

### **Products tested**

Details of the products tested are given in Table 1.

**Table 1**

<b>Code</b>	<b>Product type</b>	<b>Main external materials of construction</b>
A	Compact grills/waffle irons/toasted sandwich makers and similar	Plastic, painted metal
B	Compact grills/waffle irons/toasted sandwich makers and similar	Coated metal, plastic, bare metal
C	Compact grills/waffle irons/toasted sandwich makers and similar	Bare metal, coated metal, plastic
D	Compact grills/waffle irons/toasted sandwich makers and similar	Coated metal, plastic
E	Air fryer	Plastic, bare metal
F	Rotary grill	Glass, coated metal, bare metal
G	Toaster	Bare metal, plastic
H	Toaster (without IEC 60417-5041 (2002-01) symbol)	Bare metal, plastic
J	Portable oven	Bare metal, glass, plastic
K	Child use product - popcorn maker	Plastic, bare metal

All products were marked with the hot surface symbol from IEC 60417-5041 (2002-01)  except Code H. No products were additionally marked with "Caution, hot surface". Code D was marked "HOT" where the functional surface extended beyond the perimeter of its external casing.

## Temperature limits given by IEC 60335-2-9

Clause 11, *Heating* of IEC 60335-2-9 specifies how surface temperatures are to be measured on these types of appliances and Table 102 identifies limits for temperature rises for external surfaces. A summary of these is given in Table 2.

**Table 2**

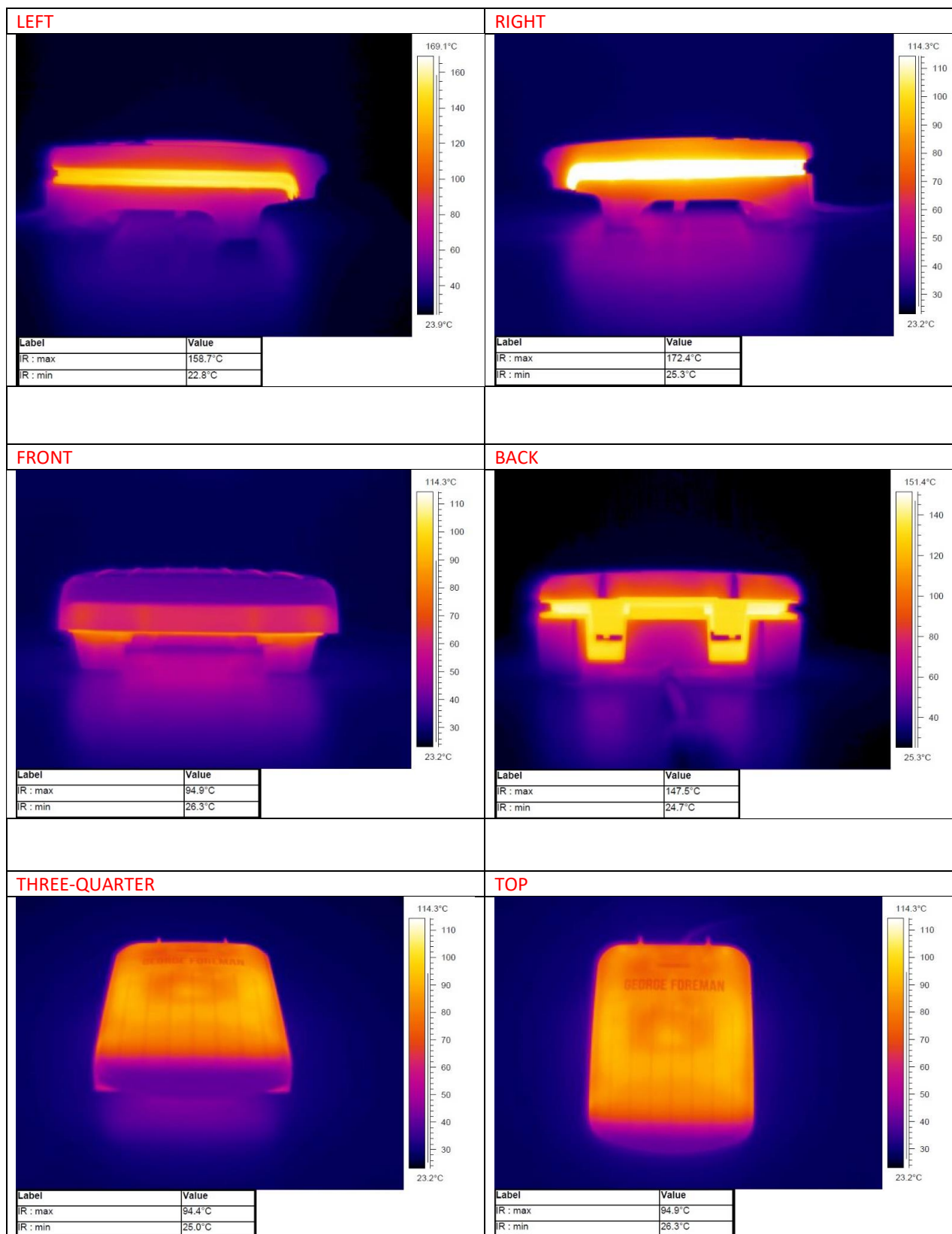
Surface	Table 102 temperature rise of external surface K (note b applies)	Actual temperature (°C), assuming 22°C ambient	Actual temperature, assuming 22°C ambient and the two times rise permitted under note b
Bare metal	45	67	112
Coated metal	55	77	132
Glass and ceramic	60	82	142
Plastic and plastic coating >0.4mm	65	87	152
note b: [from Table 102 of IEC 60335-2-9] <i>When the required values are not met, the maximum temperature rise shall not be higher than two times the values indicated.</i>			
Author's note to readers: refer to a copy of IEC 60335-2-9 to obtain full details of the content of Table 102. Note also that IEC 60335-2-9 specifies areas such as functional surfaces, areas adjacent to functional surfaces, ventilation openings etc. where surface temperatures are not subject to any limits.			

## Results

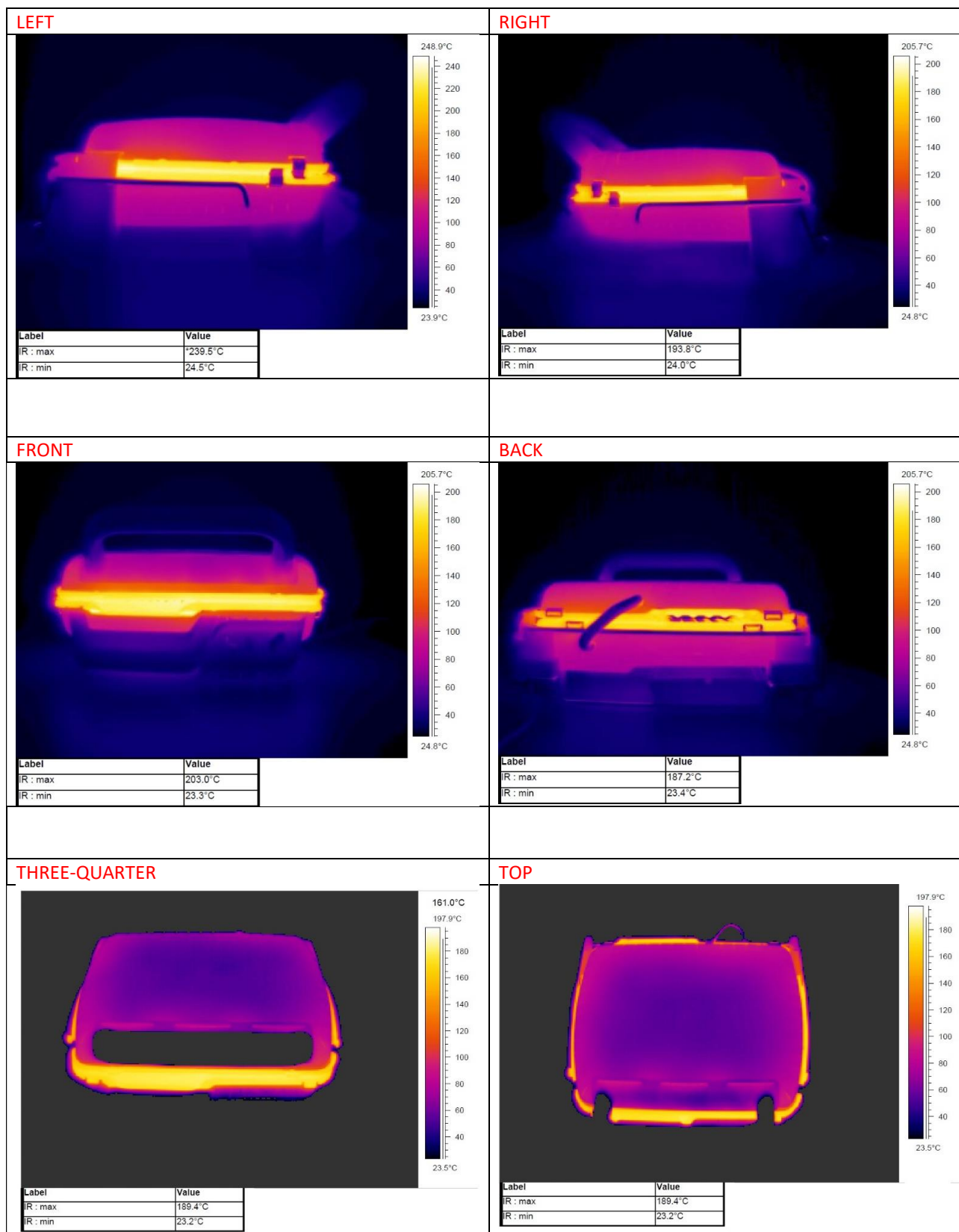
IR images are given in the pages that follow.

**Disclaimer** *The thermal images contained in this report provide a demonstration of the distribution of surface temperatures on each appliance along with a relative indication of the respective temperatures as evaluated by that thermal imaging technology. Since different temperature measurement circumstances and technologies were used to generate the data in this report it is not possible to use this information to determine whether these products are compliant with the temperature limits given in the IEC 60335-2-9 standard.*

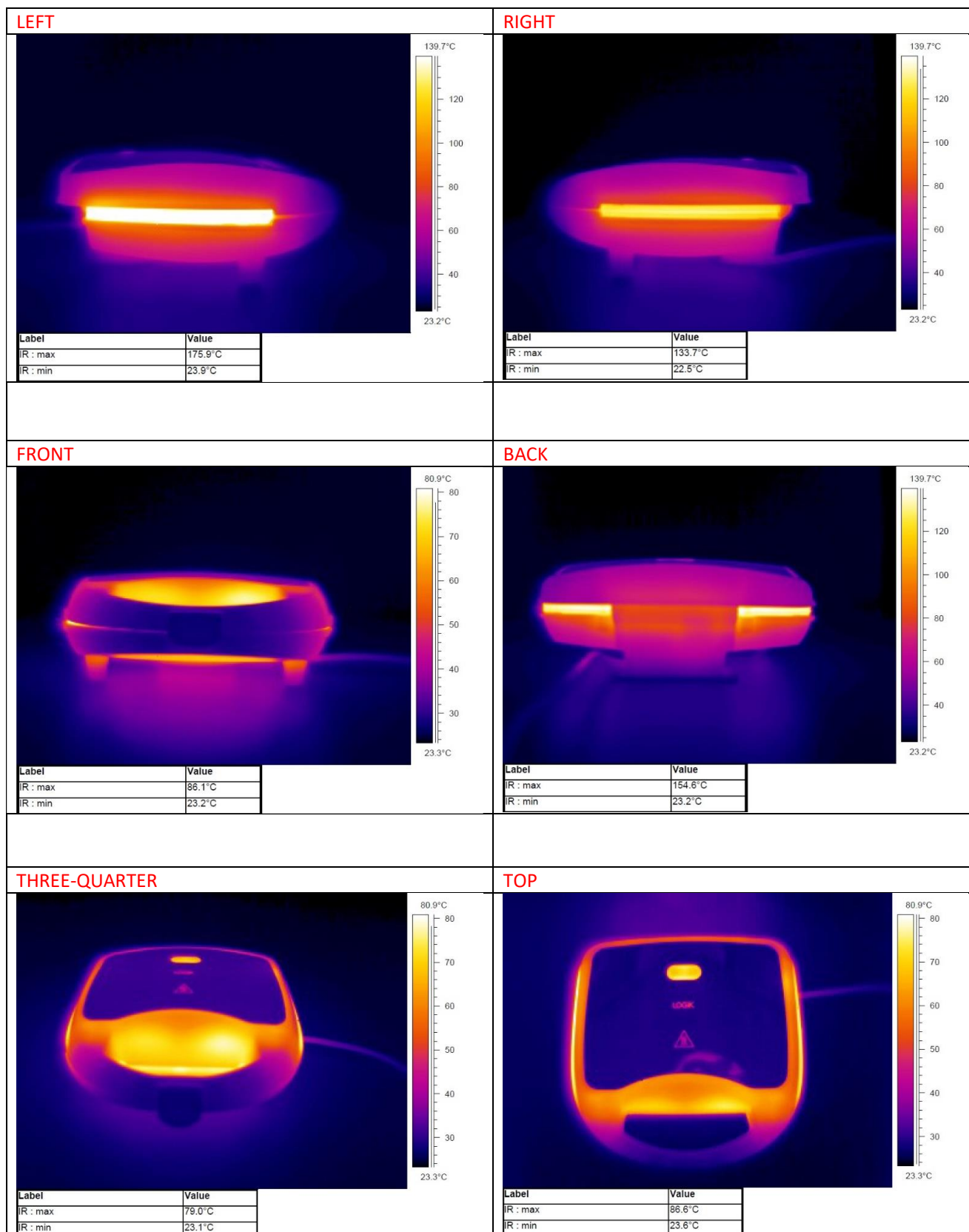
# RESULTS – PRODUCT A



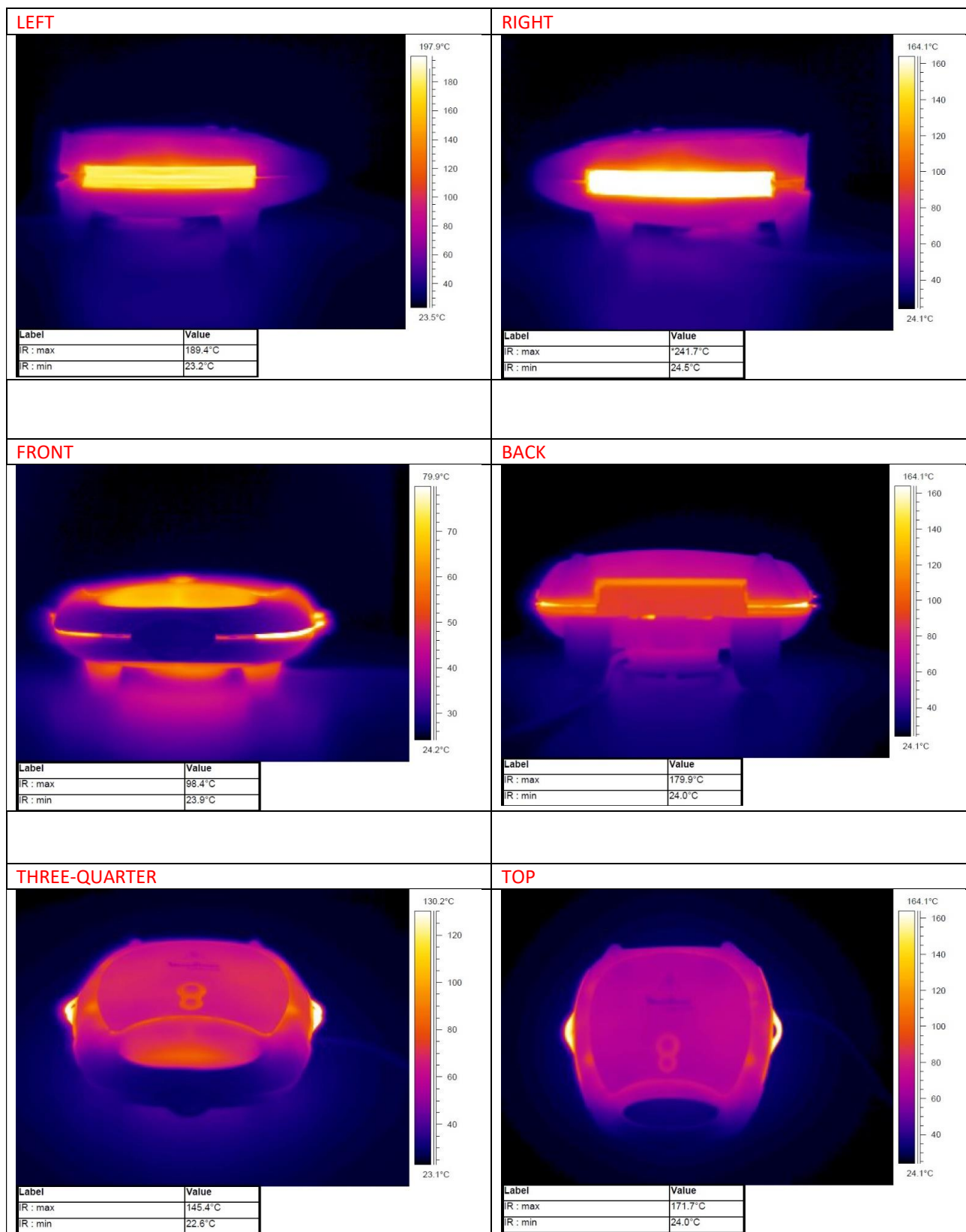
# RESULTS – PRODUCT B



# RESULTS – PRODUCT C

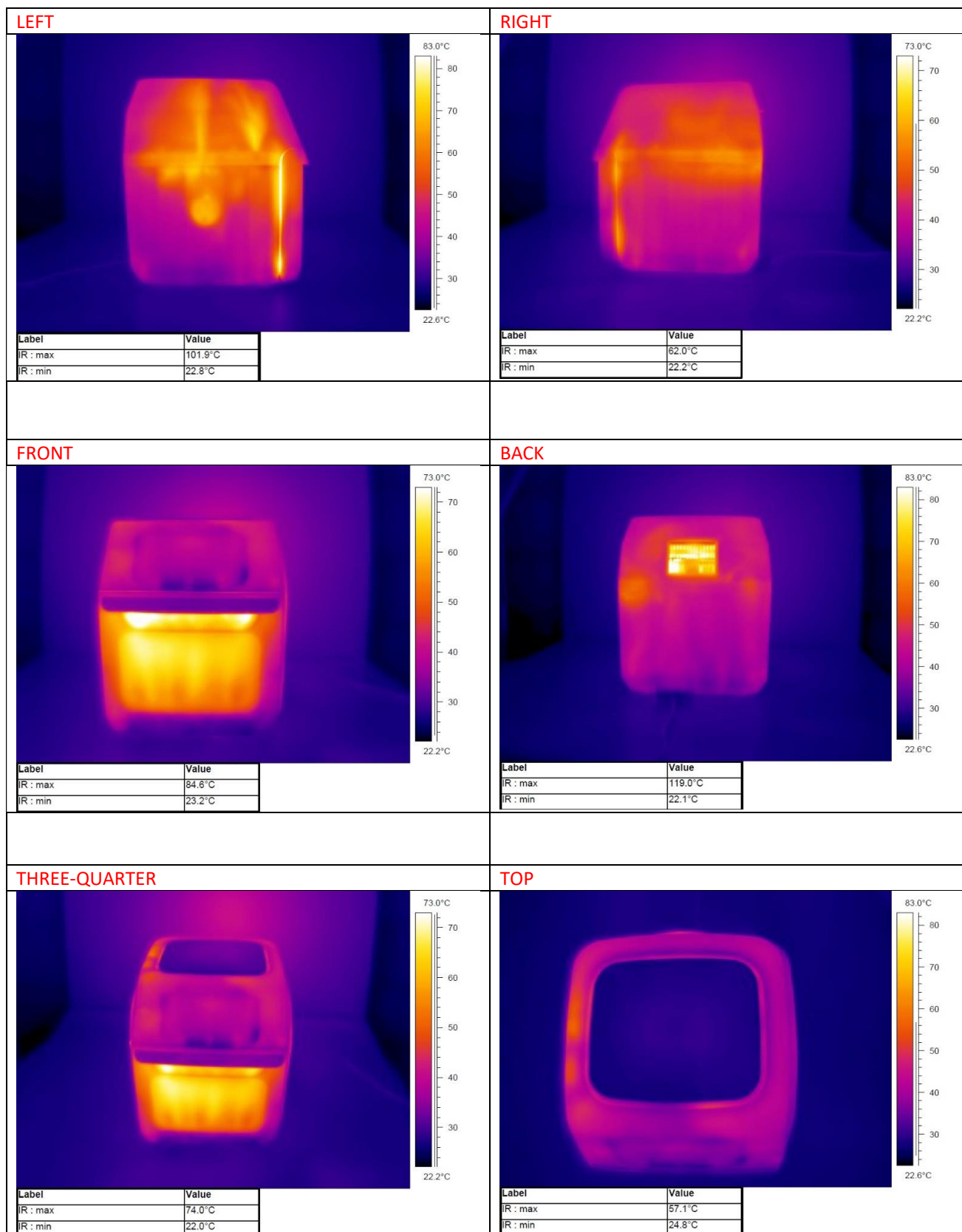


# RESULTS – PRODUCT D

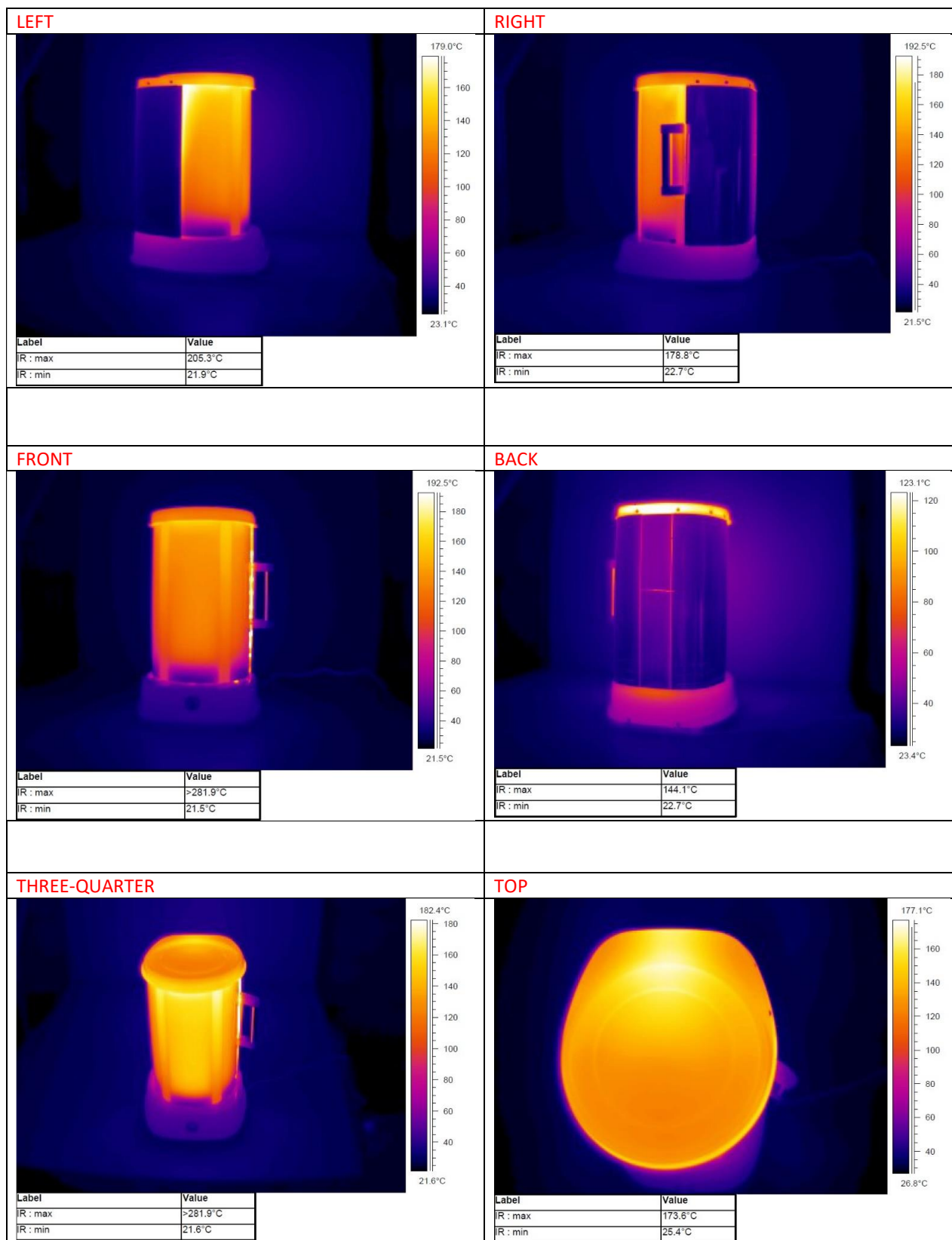




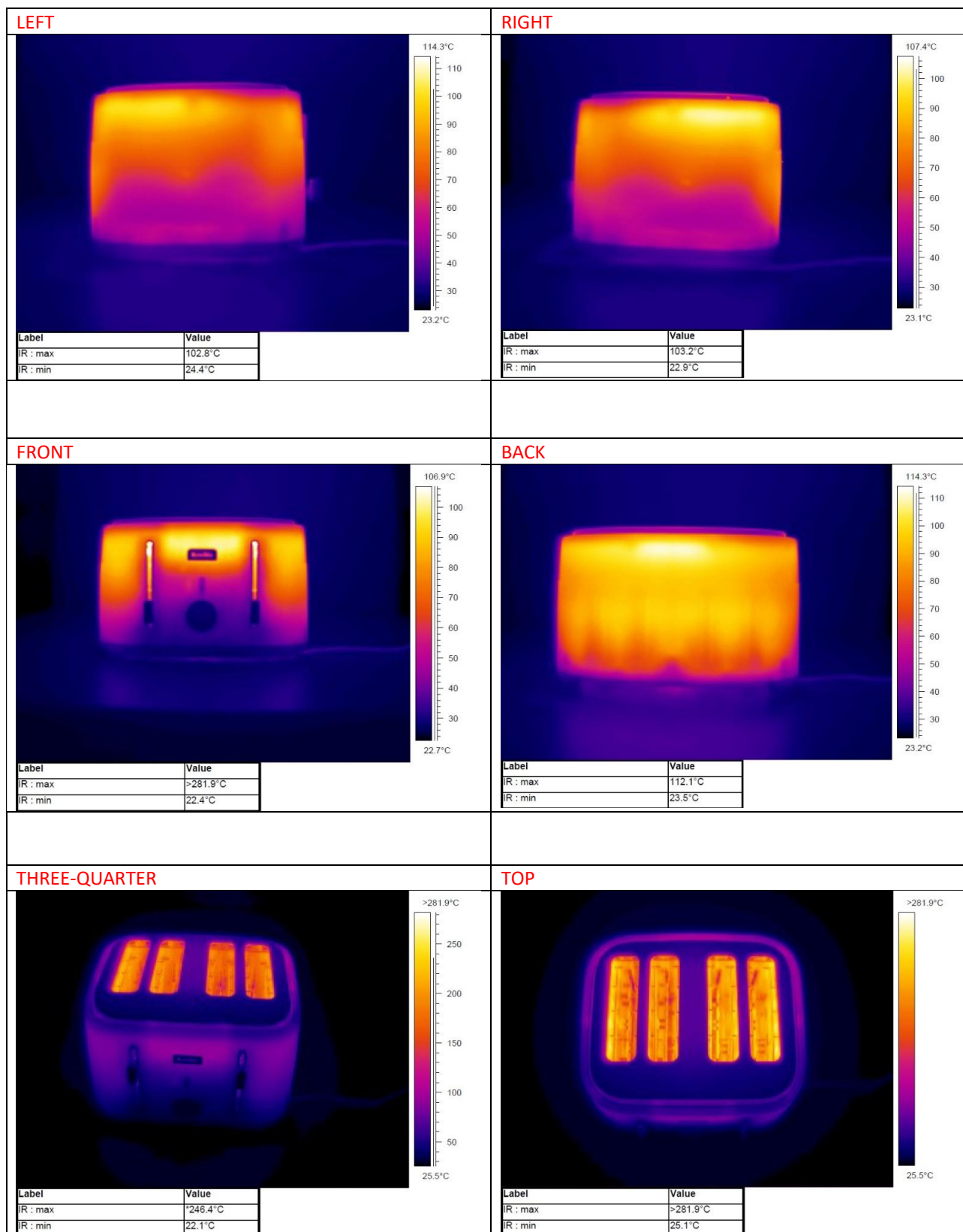
# RESULTS – PRODUCT E



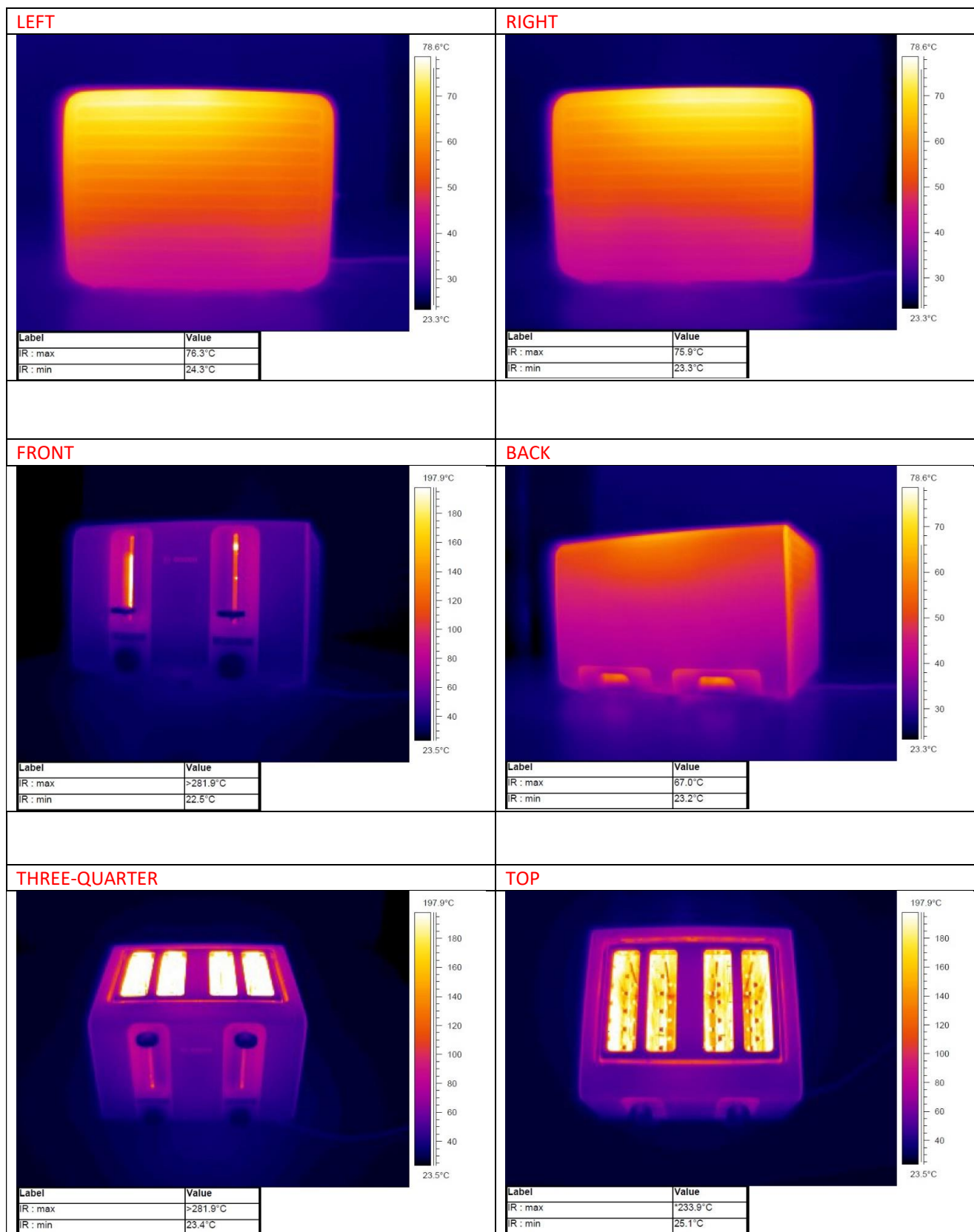
# RESULTS – PRODUCT F



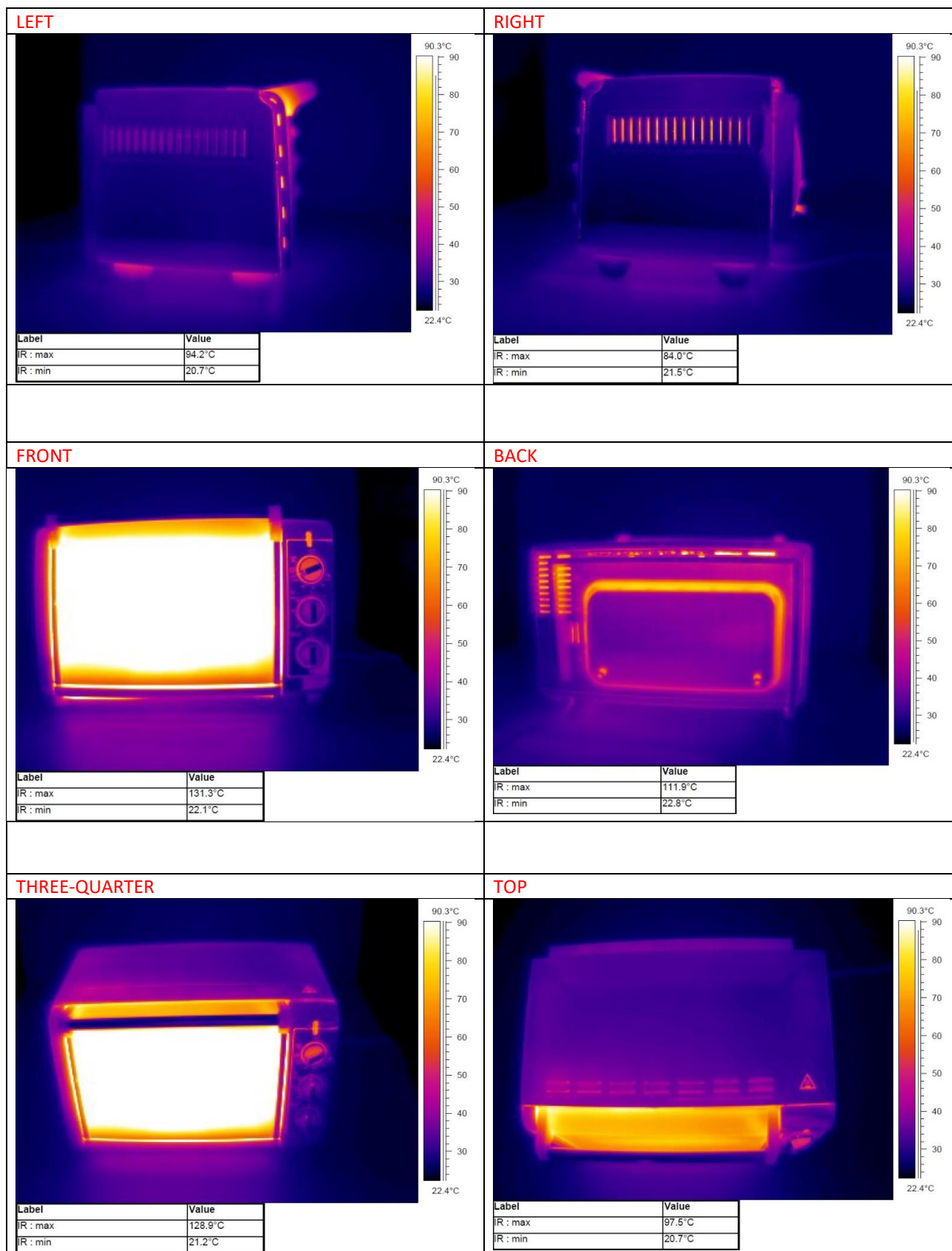
# RESULTS – PRODUCT G



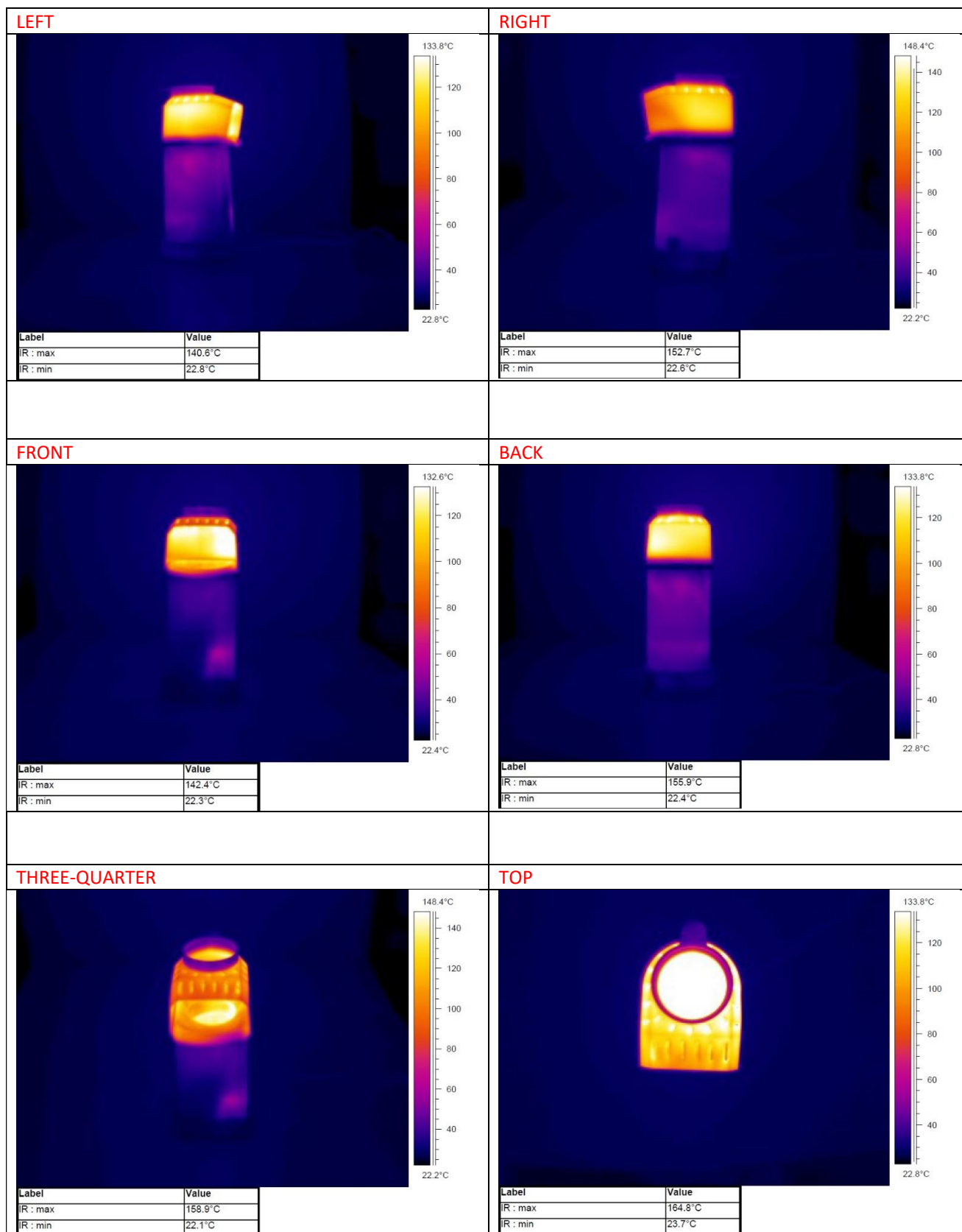
# RESULTS – PRODUCT H



# RESULTS – PRODUCT J



# RESULTS – PRODUCT K



## CONCLUSION

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The thermal images contained in this report provide a demonstration of the distribution of surface temperatures on each appliance, along with a relative indication of the respective temperatures as evaluated by that thermal imaging technology. Since different temperature measurement circumstances and technologies were used to generate the data in this report it is not possible to use this information to determine whether these products are compliant with the temperature limits given in the IEC 60335-2-9 standard.

The images should be considered as neutral, independent data to help solve the current challenges - both at the EU level and the IEC level - on surface temperature limits in the standard IEC 60335-2-9.



ANEC is the European consumer voice in standardisation, defending consumer interests in the processes of technical standardisation and the use of standards, as well as related legislation and public policies.

ANEC was established in 1995 as an international non-profit association under Belgian law and is open to the representation of national consumer organisations in 34 countries.

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