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Sent via email to: publiccomments@bis.doc.gov and DDTCPublicComments@state.gov

Regulatory Policy Division
Bureau of Industry and Security
U.S. Department of Commerce
Room 2099B
14th Street and Pennsylvania Avenue NW
Washington, DC 20230

and

Office of Defense Trade Controls Policy
Directorate of Defense Trade Controls
Bureau of Political Military Affairs
Department of State
Washington, DC 20522

Subjects: RIN 0694-AF75 - Revisions to the Export Administration Regulations (EAR): Control of Fire Control, Range Finder, Optical, and Guidance and Control Equipment the President Determines No Longer Warrant Control Under the United States Munitions List (USML)

and RIN 1400-AD32 Amendment to the International Traffic in Arms Regulations: Second Proposed Revision of U.S. Munitions List Category XII

Dear Sir or Madam:

Fluke Corporation is pleased to have the opportunity to provide feedback on the Administration's proposed rule, Amendment to the International Traffic in Arms Regulations: Revision of U.S. Munitions List Category XII ("USML Proposed Rule") and complementary revisions to the Export Administration Regulations ("EAR Revisions"). This comment focuses on proposed changes to controls related to commercial thermal imaging cameras. Fluke is very supportive of the prosed changes to the USML, as they relate to our business. This proposal is an appreciated improvement from the May 5, 2015 proposal. We do, however, remain concerned about proposed changes to the EAR, which appear to conflict with several of the stated goals of the Administration's rulemaking.

As we discussed in our comment to the first proposed revisions, the EAR Revisions create new controls on items that were not previously controlled, increases licensing requirements, and removes availability of license exceptions, and even imposes a presumption of denial for certain items, all of which appear to be contrary to the stated objectives of Export Control Reform ("ECR") to focus high-level controls on the "crown jewels" of U.S. export controlled technology, and to increase regulatory flexibility with regard to less sensitive items.

The rewrite of USML Category XII and complementary EAR Revisions was initiated to protect the commodities and components most important to our military, while providing relief to companies struggling with outdated and overly burdensome regulations by placing less sensitive items on the more flexible CCL. With respect to our industry, the USML Proposed Rule meets the first goal, but the EAR Revisions still falls significantly short of the second half of the goal.

Under the current export control model, the U.S. thermal imaging industry is already at a competitive disadvantage against our foreign competitors. To be more competitive with foreign competitors, U.S. companies must find ways to reduce the impact of export control licensing hurdles. Therefore, many U.S. multi-national companies have chosen to move research, development and manufacturing to off-shore subsidiaries outside the U.S., and in some cases U.S. companies are fully outsourcing these functions to non-U.S. companies.

While the stated goal of maintaining strict export controls around thermal imaging technology is to preserve U.S. technological and tactical advantages, we are concerned that these changes will ultimately backfire, and lead to U.S. dependence on foreign technology and/or the loss of U.S. technological advantages in this area. The impact of these decisions will be felt by the U.S. commercial base and the U.S. Government. Advanced thermal imaging technology and products will soon be dominated by foreign industries. U.S. consumers – including the U.S. Government - will have to pay more for products produced outside the U.S. and the U.S. Government may lose access to domestic sources of the newest technologies, may become reliant on foreign sources for a critical tactical capability, and our war-fighters ultimately may be put at a disadvantage. Additionally, the proposed licensing requirements for EAR items will dramatically limit U.S. companies' ability to compete with European competitors, reducing the economic viability of the U.S. thermal imaging industry.

Fluke Corporation supports the U.S. Government's desire to protect U.S. technology and national security. Export controls play an important part in this endeavor. However, if the regulations are not carefully drafted to limit the strictest controls to products and technology that are critical to our national security, are equally protected by our allies, are not already in commercial use, and are not readily available in foreign markets, export controls begin to have the opposite effect.

A. PROPOSED RULE

As noted above, Fluke is very supportive of the Administration's proposed rule, Amendment to the International Traffic in Arms Regulations: Revision of U.S. Munitions List Category XII, as it applies to our commercial thermal imaging business. We believe that the Administration addressed the concerns Fluke described in our July 6, 2015, comment to the May 5, 2015, USML Proposed Rule. We appreciate the efforts of the Administration and the Sensors and Instrumentation Technical Advisory Committee ("SITAC") in drafting a USML Proposed Rule that balances the goals of ECR and the industry's concerns.

Fluke does not have any substantive comments with respect to the USML Proposed Rule and will focus on the complementary revisions to the Export Administration Regulations.

B. EAR REVISIONS

The EAR Revisions in this proposed rule are only nominally better than the 2015 proposed rule. The second proposed rule still increases licensing requirements, removes availability of license exceptions and even imposes a presumption of denial for certain items. The proposed revisions are contrary to ECR objectives, will create an administrative burden on the civil/commercial industry, and will place U.S. companies at a competitive disadvantage.

I. RS1 + STA for 6A002 and 6A003 Will Put U.S. Industry at a Competitive Disadvantage

a. Foreign Availability of 6A993 and 6A003 Cameras

Attachment A is a foreign availability sampling of 6A993 and 6A003 cameras.[1] These cameras compete with Fluke's products, are manufactured outside of the U.S., are not subject to U.S. export controls and, to the best of Fluke's knowledge, are widely available throughout the world. Key highlights include:

- There are at least two dozen companies selling thermal imaging cameras, located in over a dozen countries.
- Competitive products are available in a wide range models with bandwidth ranging from 80x60 to 2048x1536 and frame rate from 9 Hz to 240 Hz.
- There are over twenty competitive 9 Hz camera models (6A993) manufactured in at least 8 different countries.
- There are over forty competitive cameras over 9Hz (30-240 Hz) (6A003).
- There are at least four brands in China with products ranging from 80x80 to 640x480 and 9 to 60 Hz.

b. Rollback of the 2009 Regional Stability Rule

In 2009, BIS revised the license requirements and license exception eligibility for certain thermal imaging cameras by implementing §742.6(a)(2)(ii) and (v) ("Regional Stability Decontrol"), recognizing the emerging availability of these cameras around the world and the export licensing practices of other Governments.[2] While the Regional Stability Decontrol rule does add some complexity to interpretation of 6A003 export controls, the rule put U.S. exporters on equal ground with our European and Japanese competitors, as the effect of the BIS rule is similar, for certain types of cameras, to the European Union's (E.U.) Community General Export Authorization (CGEA) and Japan's Bulk License, which cover most dual-use items, including thermal imaging cameras.

The Regional Stability Rule had its desired effect immediately. BIS's own data showed that "[t]here has been a spike in both U.S. and non-U.S. dual-use uncooled infrared camera sales from 2009-2010. This spike in sales coincides with the implementation of the 2009 rule that reduced licensing requirements to some regime partners for dual-use uncooled infrared cameras controlled under ECCN 6A003."[3]

License exception APR, when coupled with the RS Decontrol, further synchronizes the U.S. with our trading partners by authorizing transfers and many re-exports. From the customer's perspective (in an NLR country), purchasing a U.S. 6A003 camera is very much like purchasing an E.U. 6A003 camera – no administrative hurdles and relative freedom of ownership after the purchase.

This EAR Revision proposes to roll back the benefits afforded under the 2009 rule to "harmonize and simplify the EAR," which from the simple perspective of reading and interpreting the rule, the Administration will achieve this goal. However, from the exporter and customers' perspectives the EAR Revision creates dissonance with the export control systems of our close allies and complicates the sale, purchase and ownership of these cameras. The Regional Stability Decontrol was the first step in

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[1] Data provided for the most part is publically available information. In some cases (when data was not publically available), data provided is based on Fluke's knowledge of the industry or best estimates, and may not be 100% accurate. If Country of Origin data was not publically available, Fluke provided the best known location of the company headquarters.

[2] See 74 FR 23941.

[3] See https://www.bis.doc.gov/index.php/forms-documents/doc_view/630-night-vision-assessment

harmonizing the U.S. with the rest of the world and putting the U.S. camera manufacturers on equal footing with our foreign competitors. Any move away from the current state will have the simple effect of returning U.S. manufacturers to the competitive disadvantage they labored under prior to the 2009 changes.

c. STA vs. Regional Stability Decontrol & APR

BIS believes that the availability of STA should alleviate this concern. While the roll back doesn't take us all the way back to individual validated licenses ("IVL"), it dramatically increases administrative burdens, placing compliance requirements upon our international partners, slowing our ability to deliver to customers on time, which in turns places us at a competitive disadvantage as compared to our foreign competitors, including those within Wassenaar countries.

About 25% of Fluke's annual sales (thousands of transactions, all managed by distributors) will require additional administrative work, time and support under the STA regime. Companies in China, Japan and the E.U. manufacture products that complete with Fluke's 6A003 30/60 Hz cameras.[4] Faced with the option to purchase two cameras with equal banner specs – one from the U.S. and one from a non-U.S. Wassenaar country – the customer will likely choose the non-U.S. camera, because they won't have to execute the required STA assurance. Despite the Commerce Department's apparent efforts to convince foreign buyers that executing an STA assurance does not impose any additional compliance requirements, this message has largely fallen on deaf ears in Europe.

Following BIS's 2014 decision to change Mexico to NLR for NS2 and RS2, Fluke witnessed in real time proof that more customers will purchase our U.S. manufactured cameras if they are not burdened by export legal paper work. Sales increased immediately when partners and customers learned that they no longer had to obtain individual licenses. Mexico is not an STA country and will once again require an IVL under the EAR Revisions. Fluke fully expects that its commercial thermal imaging business in Mexico, which just got into a new sales process, will be affected by any new license requirement.

Furthermore, less than 5% of Fluke's 6A003 cameras are sold to countries that, under today's controls, require an IVL ("IVL Countries"). In contrast approximately 60% of 6A993 cameras are sold to 6A003-IVL countries. Based on customer and distributor feedback, Fluke strongly believes that the administrative burdens of U.S. export licensing account for this huge inconsistency. We are very concerned that moving to an STA model will have a similar impact on Fluke's sales of 6A003 cameras in STA countries.

Fluke's sales model heavily depends on distributors throughout the world. We've observed that our international partners focus their efforts on selling product with the least amount of additional administrative work. Their perception is that the extra paperwork and time delays related to compliance approvals are too complicated and burdensome. And we hear time and time again that our competitors aren't requiring the same level of end-user documentation and compliance approval; that's because our competitors are not subject to U.S. export control jurisdiction and their jurisdictions do not have the same level of administrative hurdles for selling these cameras. Unless the U.S. government can convince countries like Russia, China, and many E.U. countries to adopt similar export control requirements, the primary impact of the change will be to reduce U.S. share of the commercial thermal imaging market, weakening U.S. manufacturers and strengthening foreign manufacturers by shielding them from competition.

[4] See Attachment A.

d. Recommended Alternative – RS2

If BIS would like to harmonize thermal imaging camera export controls with our allies and allow U.S. companies, like Fluke, who have chosen to manufacture 6A003 cameras in the U.S., to compete effectively with competitors that manufacture off-shore, BIS should change all 6A003 cameras with a frame rate of ≤60Hz to RS-2 control. This would acknowledge the reality that competitive thermal imaging technology is available from at least two dozen foreign manufacturers around the world,[5] permitting U.S. companies to continue to compete on a level playing field within Country Group A:5.

II. Increase Controls for Infrared Detection Items is Contrary to ECR and Hampers U.S. Innovation and Competitive Ability:

a. Restrictions on the Use of License Exceptions STA and TSR

The EAR Revisions propose to eliminate STA eligibility for certain thermal imaging related ECCNs 6A002, 6D002, 6D003, 6D991, 6E001, and 6E002, as well as TSR eligibility for the export of 6E001 and 6E002 technology to our allies in A:5 countries. Given the current state of thermal imaging research, development and manufacturing, which is now spread throughout the globe, Fluke does not support elimination of STA for these ECCNs, and a return to individual license requirements for even our closest allies. While strong controls on certain components and development technology may be warranted, removal of STA eligibility for 6A002, 6E001, and 6E002 items undermines the flexibility of EAR controls on commercial thermal imaging devices, and would negatively impact the competitiveness of U.S. industry by burdening its ability to work cooperatively, even internally within corporate affiliates located in the European Union and other Wassenaar Arrangement countries.

Practically speaking, these changes will dramatically increase the administrative burden of U.S. industry and BIS. Multinationals that are now employing TSR and STA to support foreign subsidiaries in R&D, manufacture and service will now have to apply for licenses to export such technology to close allies, reducing the regulatory flexibility that has been in place and working well since 2009.

b. Expansion of Military End-User Controls

The Administration has stated since the beginning of the Export Control Reform Initiative that the reforms will be consistent with U.S. obligations to the multilateral export control regimes, and to the extent feasible, keep controls aligned with those of the regimes. This EAR Revision proposal to add a military end-user restriction to 6A993 cameras exported to every destination except Canada is far from aligned from these stated objectives.

Our allies in the E.U. and other Wassenaar countries don't even consider 6A993 cameras to be dual use items, i.e. 9 Hz thermal imaging cameras do not even have a military purpose, only civil purpose. But the issue of dual use or not, is not our concern. Our concern is the overly broad imposition of an end-user restriction, which essentially equates to a worldwide arms embargo on civilian cameras which are widely and commercially available around the globe, and which are subject to no multilateral export controls whatsoever. As discussed above, these cameras are manufactured by at least two dozen different manufacturers in the Americas, Europe and Asia, and are widely available throughout the world.[6]

The U.S. proposal is misaligned with the European Commission and E.U. member states, which in the first place don't even regulate these 9 Hz cameras, but second for those 6A003 cameras they do, they

[5] See Attachment A.
[6] See Attachment A.

would only impose military end-use/end-user restrictions on countries with which they have an arms embargo. Control at 6A993 with AT control, as well as the existing military end-use/r restrictions for China, Russia and Venezuela, is a reasonable alignment with multilateral controls. Anything more will only serve to harm U.S. industry, not protect U.S. national security.

Managing sales of 6A003 items that are subject to Section 744.9 is already a challenge. The proposed revisions on 6A993 cameras will significantly increase the complexity and burden on the U.S. thermal imaging industry. Many infrared cameras controlled by 6A993 are low-cost, consumer goods that are distributed internationally, often through multiple distributors and sometimes sold in storefronts and on-line.

Military end-users do sometimes purchase Fluke's 9Hz cameras worldwide (except where currently prohibited). These customers do not, however, purchase our cameras for military end-uses, but rather typically purchase the Fluke cameras for generic civil purposes such as: inspection of buildings for improperly installed or missing insulation, defective seals on doors and windows, and problems with HVAC installations. Fluke's distribution network includes well over a thousand distributors, and many of these cameras are sold through second and even third tier channels. Adding 6A993 to the list of items subject to 744.9 will be an overwhelming administrative/resource burden to implement proper controls. New processes, forms, training, and audits, both internally and with all global subs to control for this rule will be required. The increased administrative burden on distributors will hinder sales of these items, especially for 6A993.a cameras, and cause a significant competitive disadvantage.

BIS explained that "agencies determined that 9 Hz cameras are used in foreign-made military commodities and thus merited inclusion in §744.9." Fluke is not aware of any circumstance where any of our 6A993 9Hz thermal imaging cameras were incorporated into another commodity or system, especially a military commodity. Indeed, these are fully-packaged, commercially available cameras, and it strains credulity to think they would be used tactically, or incorporated into some other commodity. We strongly disagree with the theory that cameras, such as Fluke's, which are fully assembled and independently functioning, handheld, screen-display thermal cameras would be used in foreign-made military commodities. With their bright displays and hand-held form factors, these cameras are not effective in a tactical setting.

It is certainly workable for certain camera cores and FPAs, which are available worldwide, to be procured by military end-users for integration into tactical military systems. If BIS intended to focus this rule on camera cores or other camera form-factors that are easily incorporated into other end-items, Fluke recommends that BIS exclude those cameras that are put up for commercial sale as fully assembled and independently functioning, handheld, screen-display thermal cameras from the licensing requirements of EAR 744.9.

The commercial availability of foreign manufactured cameras and the very typical distributor/store based sales model for these low end cameras results in a feasibility of control, for the proposed control, which is very low. These changes are also inconsistent with the goals of ECR, which include facilitation of cooperation with multilateral regime partners, and not imposing new export controls on items without clear national security justification and a push for multilateral controls.

c. ROICs specially designed for 6A002.a.3 FPAs

Fluke strongly supports the move from the USML of read-out integrated circuits (ROICs) that are specially designed for 6A002.a.3 FPAs to 6A990. As Fluke and other commenters demonstrated in public comments to the 2015 proposal, these IRFPAs are manufactured in many countries, including China, and are widely available worldwide. These IRFPAs and their associated ROICs no longer warrant control on the USML.

The civil automotive application carve out in the note to 6A990.a, however, doesn't technically make sense as written. Historically, most, if not all, of the IRFPAs used in civil automotive applications have been general purpose IRFPAs that are used in numerous other applications. It is not at all clear or evident what properties of an IRFPA, and/or its corresponding ROIC, are peculiarly responsible for achieving or exceeding the performance levels, characteristics, or functions of civil automotive applications. Nor is it clear why these ROICs are any different than those used in all other applications.

Apparently, BIS included this automotive carve out "in order to address technological and market developments." It is Fluke's opinion that IRFPAs and ROICs used in other civil or dual use applications have achieved the same technological and market developments as those in the automotive industry, and therefore all ROICs specially designed for civil applications should be excluded from control.

d. Software Expansion

The EAR Revision proposes to expand 6D991 ("development," "production," or "use" of 6A002, 6A003, or 6A990 items) to include software specially designed for the "development," "production" or "use" of 6A002 and 6A003 items, and make 6D991 ineligible for License Exception STA or TSR.

These proposed controls could affect Fluke software used in the production and testing of 6A003, and possibly 6A993, items, although it is not clear the extent to which the controls would apply to particular types of software, due to the difficulty of applying the "specially designed" concept to software. It could potentially cause Fluke to need to get licenses to authorize the provision of field testing software to its service centers even in A:5 countries, since such software would not be STA eligible. At minimum, such items should be STA eligible to avoid undue burdens on the servicing and production capabilities of companies like Fluke.

C. CONCLUSIONS

Overall, Fluke is very supportive of the USML Proposed Rule, which are aligned with Export Control Reform goals, are technically sound and support and enable the U.S. commercial thermal imaging industry in a completive international industry. We appreciate the great efforts of the Administration in reaching this workable solution.

With respect to the EAR Revisions, we conclude there are still many fundamental flaws, which undermine the policy objectives of Export Control Reform, and the objectives of the U.S. export control regime in general. The overall effect of these controls will likely be to reduce the competitiveness of U.S. industry, sheltering foreign competitors and enabling them to gain a greater share of the commercial and military markets. This may lead to increased costs for the U.S. government, potential loss of U.S. technological edge, and ultimately to greater U.S. government reliance on foreign-sourced thermal imaging commodities. Fastening the export control tethers too tightly, without regard to existing foreign availability and the intertwined relationship between a healthy U.S. commercial thermal imaging industry

and a healthy U.S. military industry, may unintentionally transform those tethers into a noose, choking off a key source of important tactical technology for the U.S. government, while simultaneously pushing good U.S. jobs offshore to foreign competition.

Thank you once again for the opportunity to provide comments on this proposed rule. We would be pleased to discuss any of this with BIS.

Submitted on Behalf of Fluke Corporation by,

Matthew Schmidt, Director, Business & Technology Development

Jennifer Christy, Senior Manager, Trade Compliance

Slone Pearson, International Trade Compliance Counsel

Brand	Model	Resolution	Frame Rate	Country of Origin or HQ if COO Unknown	Link to Specs
BritIR	BO	80x80	50 Hz	China	http://www.guideinfrared.com/Plus/m_default/Cms/docDetail.php?ID=60
BritIR	B1	160x120	50 Hz	China	http://www.guideinfrared.com/Plus/m_default/Cms/docDetail.php?ID=60
Chauvin Arnoux	C.A 1950 DiaCAm 2	80x80	9 Hz	France	http://www.chauvin-arnoux.com/sites/default/files/D00VTP46.PDF
Chauvin Arnoux	C.A 1886 RayCAm	160x120	9/50Hz	France	http://www.chauvin-arnoux.com/sites/default/files/D00UQE34_0.PDF
Chauvin Arnoux	C.A 1888 RayCAm	384x288	9/50Hz	France	http://www.chauvin-arnoux.com/sites/default/files/D00UQE34_0.PDF
Cordex	TC7150	320x240	9 Hz	UK	http://www.cord-ex.com/products/tc7150-nrtl-listed-infrared-camera/
Cordex	TC7000	320x240	9 Hz	UK	http://www.cord-ex.com/products/tc7000-atex-iecex-certified-infrared-camera/
Dali	LT3	160x120	50/60 Hz	China	http://www.dali-tech.us/products/lt3-lt7-series-50.html
Dali	LT7	160x120	50/60 Hz	China	http://www.dali-tech.us/products/lt3-lt7-series-50.html
Dali	T4	160x120	50/60 Hz	China	http://www.dali-tech.us/products/t4-t8-series-51.html
Dali	T8	160x120	50/60 Hz	China	http://www.dali-tech.us/products/t4-t8-series-51.html
Dali	700E+	384×288	50/60 Hz	China	http://dalitech.en.ecplaza.net/dl-700e--95415-295164.html
FLIR	T420	320x240	9/60 Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.60701284.817447732.1453230622
FLIR	T440	320x240	9/60 Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.60701284.817447732.1453230622
FLIR	T460	320x240	9/60 Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.60701284.817447732.1453230622
FLIR	E8	320x240	9/60 Hz	Estonia	http://www.flir.com/e-series/
FLIR	E40	160x120	9/60 Hz	Estonia	http://www.flir.com/e-series/
FLIR	E50	240x180	9/60 Hz	Estonia	http://www.flir.com/e-series/
FLIR	E60	320x240	9/60 Hz	Estonia	http://www.flir.com/e-series/
FLIR	T600	480x360	30Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.124140995.817447732.1453230622
FLIR	T620	640x480	30Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.124140995.817447732.1453230622
FLIR	T640	640x480	30Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.124140995.817447732.1453230622
FLIR	T660	640x480	30Hz	Sweden	http://flir.com/uploadedFiles/Instruments/Products/T-Series/T-Series-Brochure.pdf?_ga=1.124140995.817447732.1453230622
HT Italy	THT45	80x80	50 Hz	Italy	http://www.ht-instruments.com/en/products/infrared-cameras/compact/tht45/
HT Italy	THT46	160x120	50 Hz	Italy	http://www.ht-instruments.com/en/products/new-products/infrared-cameras//
HT Italy	THT47	160x120	50 Hz	Italy	http://www.ht-instruments.com/en/products/infrared-cameras/touch-screen-termo/tht47/
HT Italy	THT60	160x120	50 Hz	Italy	http://www.ht-instruments.com/en/products/infrared-cameras/touch-screen-termo/tht60/
HT Italy	THT70	384x288	50 Hz	Italy	http://www.ht-instruments.com/en/products/infrared-cameras/touch-screen-termo/tht70/
i3system	THERMAL EXPERT	384x288	9 Hz	Korea	http://www.buykorea.org/product-details/thermal-expert--3041491.html and http://www.i3-thermalexpert.com/product
Infratec	VarioCam HD 900	2048x1536	30/60/120/240 Hz	Germany	http://www.infratec-infrared.com/thermography/infrared-camera/variocamr-high-definition.html
Infratec	VarioCam HD 700	1280x960	60/120/240 Hz	Germany	http://www.infratec-infrared.com/thermography/infrared-camera/variocamr-hd-inspect-700.html
Infratec	VarioCam HR 600	640x480	60 Hz	Germany	http://www.infratec-infrared.com/thermography/infrared-camera/variocamr-hr-head-600-series.html
Infratec	InfraTec mobileIR	384x288	50/60 Hz	Germany	http://www.infratec-infrared.com/fileadmin/downloads/pdf/mobileIR_E9_mail_en.pdf
Jenoptik	IR-TCM-HD 1024 and 640; Variocam HD 1024 and 640	IR-TCM-HD 1024 (1024x768) and 640 (640x480); Variocam HD 1024 (1024x768) and 640 (640x480)	IR-TCM-HD 1024 (30Hz) and 640 (60Hz); Variocam HD 1024 (30Hz) and 640 (60Hz)	Germany	https://www.jenoptik.com/products/cameras-and-imaging-modules/thermography-camera
Avio (NEC)	R500	1280x960	7.5/60 Hz	Japan	http://www.daqlog-systems.co.uk/thermal-imaging/cameras/item/70-avio-r500-r500pro#specifications
SAT (Satir)	G96	640x480	50/60 Hz	China	http://www.satir-uk.com/wp-content/uploads/SATIR-Data-Sheets-G96.pdf
SKF	TMTI 300	16x16	8Hz	Sweden	http://www.hivimar.com/en/promociones/documentos/SKF%20TMTI300%20Ingles.pdf
Testo	869	160x120	9Hz	Germany	https://www.testo.com.br/detalhes_do_produto/0560+8690/testo-869-Thermal-imager#tab-8
Testo	870-1	160x120	9Hz	Germany	https://www.testo.com/product/0560+8701/testo-870-1-Fixed-focus-thermal-imager-160-x-120-FPA-#tab-8
Testo	870-2	160x120	9Hz	Germany	https://www.testo.com/product/0560+8702/testo-870-2-Fixed-focus-thermal-imager-160-x-120-FPA-#tab-8
Testo	875	160x120	9/33Hz	Germany	https://www.testo.com/en/home/products/thermography/875_series/875_series.jsp
Testo	885-1	320x240	33Hz	Germany	https://www.testo.com/product/0563+0885+V1/testo-885-1-Thermal-Imager-320-x-240-FPA-#tab-8
Testo	885-2	320x240	33Hz	Germany	https://www.testo.com/product/0563+0885+V2/testo-885-2-Thermal-Imager-320-x-240-FPA-#tab-8
Testo	882	320x240	33Hz	Germany	https://www.testo.com/product/0560+0882/testo-882-Adjustable-focus-thermal-imager-320-x-240-FPA-#tab-8
Testo	890-1	640x480	33Hz	Germany	https://www.testo.com/product/0563+0890+V1/testo-890-1-Thermal-Imager-640-x-480-FPA-#tab-8
Testo	890-2	640x480	33Hz	Germany	https://www.testo.com/product/0563+0890+V2/testo-890-2-Thermal-Imager-640-x-480-FPA-#tab-8
Therm-App® (under Opgal)	Therm-App® TH	384x288	8.7Hz	Israel	http://therm-app.com/therm-app-thermography/
Trotec	IC Series, EC Series, AC080V	IC Series (160x120 and 384x288); EC Series (160x120); AC080V (160x120)	IC Series (50/60Hz); EC Series (50/60Hz); AC080V (50/60Hz)	Austria	https://uk.trotec.com/products/measuring-devices/temperature/
Vacker	IC080LV	160x120	50/60Hz	Unknown	https://www.vackergroup.ae/our-products/measuring-instruments/
WUHAN GUIDE INFRARED (MegaBras)	Easir 4	160x20	50/60Hz	China	http://guideinfrared.com/Plus/m_default/Cms/docDetail.php?ID=42
Xenics	Bobcat, Gobi, and Onca	Various	Various	Belgium	http://www.xenics.com/en/products/cameras?f[0]=field_thermography_term%3A630