



Victoria Business Park
206 Star of India Lane
Carson, CA 90746
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AUFIRE - ELECTRICAL OUTPUT EXPLANATION

AUFIRE is a law enforcement and military training tool that provides realistic stress based training. AUFIRE uses the principles of Electrical Muscle Stimulation ("EMS") to cause muscle contraction in limbs to simulate disabling injuries.

Electrical Muscle Stimulation (EMS) contracts muscles by applying electrical impulses. For decades, this practice has been used for medical, therapeutic, and athletic purposes. Consumer EMS products are widely available over-the-counter for the general public to purchase. The FDA has deemed these products safe for use without formal training or certification.

AUFIRE is not a medical device and does not fall under the jurisdiction of the FDA. AUFIRE has not undergone any independent medical safety testing. However, AUFIRE was designed and an independent organization has tested AUFIRE to be within the parameters of 4 randomly selected over-the-counter EMS units. More specifically: AUFIRE was evaluated and compared to EMS systems for over a dozen electrical characteristics. A summary of all of the comparison testing is listed below in Chart 1.

For summary purposes, the total electric charge delivered to the human body is in the median (medium) range of the EMS evaluated. Total electrical charge can be thought of as the total amount of electricity that is absorbed by the stimulated muscle group. Electric charge is measured in coulombs, however, EMS applications use such a small amount of electricity that we measure this value in units of micro-coulombs (uC).





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Laboratory measurements showed that the pulses generated by the AUF system deliver 35 μC per impulse. The average value of other EMS systems that were evaluated is about 64 μC per impulse. The AUF system generates pulses at the same rate as the other systems that were evaluated. It is by this comparison that we demonstrate that the AUF system performs within the typical performance of over-the-counter EMS systems that are approved by the FDA for use by the common consumer.

For more technical analysis, we have characterized electrical performance of the AUF system, as well as common over-the-counter systems in Chart 1. In addition to total electric charge, maximum output voltage, pulse shape, pulse rate, pulse duration, and duty cycle was measured. The total electric charge referenced above takes into account all of these parameters. Data measured shows that each of these parameters is consistent with nominal values presented by over-the-counter EMS products. For example, the maximum voltage generated by the AUF system is below the average value measured on the set of over-the-counter systems. Additionally, the pulse rate is on-par to the average of other systems that were sampled. Similar comparisons can be made for each of the characteristics we evaluated.

When compared to over-the-counter products, we have demonstrated that the amount of electrical charge delivered to the human body by the AUF EMS system is below the average of the consumer ready EMS products on the market.





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AUFIRE - ELECTRICAL OUTPUT EXPLANATION - CHART 1.

Manufacturer -->		AUFIRE	Chattanooga Group	Everway Medical Instruments Co., Ltd.	Easy Healthcare Corp.	DJO, LLC Compex.com
Model		Trainer	Intellect® NMES	Balego NMES (EV-805)	easy@Home EHE012PRO	SPORT ELITE TENS 2.0
Serial		5	(21)B839792	(01)04719871184066(21) 2009241883	LOT EH-190905-01	SN-ZZS023516
Test Date		3/2/2021	3/2/2021	3/3/2021	3/4/2021	3/4/2021, 3/5/2021
Measurement with 500 ohm load		Units				
"Ramp" (minimum)	See column -->	4.2µS	1 Second	1 Second	~500 nanoseconds	
"Rate" (maximum)	Hz	~111.8	120 (actual = ~105.3)	150	80.13	120 (not yet verified) [Observed max so far: 105.9Hz]
Pulse shape	See column -->	Biphasic	Monophasic	Monophasic	Biphasic/Triphasic- see scope captures	Biphasic
Total pulse duration ("Width") (minimum)	µS	500	54.4	50	270 (Leg)	200 (from user manual- not yet verified)
Total pulse duration ("Width") (maximum)	µS	500	300	300	318	808
Biphasic positive pulse duration, if applicable (minimum)	µS	250	n/a	n/a	91 (Leg)	TBD
Biphasic positive pulse duration, if applicable (maximum)	µS	250	n/a	n/a	106	404
Biphasic negative pulse duration, if applicable (minimum)	µS	250	n/a	n/a	91 (Leg)	TBD
Biphasic negative pulse duration, if applicable (maximum)	µS	250	n/a	n/a	106 (Continuous)	404
Output pulse train duty cycle (maximum)	%	5.1	2.5	4.23	1.038	TBD
Output voltage P-P (maximum)	V	70	50.6	40.6	158	134
Pulse rise duration	See column -->	4.2µS	12.5µS	6µS	~500 nanoseconds	TBD
Pulse fall duration	See column -->	4.2µS	8.3µS	10µS	~500 nanoseconds	TBD
Burst attack duration (minimum)	mS	0.0042	~728	896	~1200	TBD
Burst decay duration (minimum)	mS	0.0042	1000	960	108	TBD
Burst duration ("ON Time") (minimum)	S	0.624	1.72	2	271 ("Beat")	TBD
Burst duration ("ON Time") (maximum)	S	∞	90	90	5.28 ("Knead")	TBD
Duration between bursts ("OFF Time") (minimum)	S	0	2	0	1.67 ("Knead" "Leg")	TBD
Microcoulombs Estimate (for reference only)		35	148	26	48	457
Pulse shape (from user manual)						"Constant rectangular current with pulse compensation to eliminate any direct current component to prevent residual polarization at skin level"
Maximum pulse intensity (from user manual)						"120mA"
Pulse intensity increments (from user manual)						"manual adjustment of stimulation intensity from 0 to 999 (energy) in minimum increments of 0.5 mA"
Pulse width (from user manual)						"200 to 400 µS"
Maximum electrical charge per pulse (from user manual)						"96 microcoulombs (2x48 µC, compensated)"
Standard pulse ramp-up time (from user manual)						"3 µs (20%-80% of maximum current)"
Pulse frequency (from user manual)						"1 to 120 Hz"





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ELECTRICAL OUTPUT COMPARISON

AUFIRE Vs. Top E-Stim Units

AUFIRE delivers a lower voltage and microcoulomb dosage in comparison to common over-the-counter E-Stim systems.

