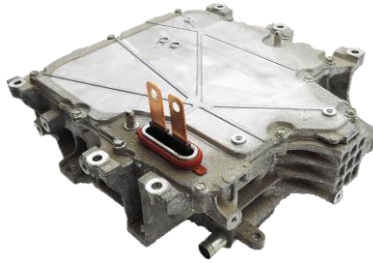




2018 Tesla Model 3



2019 Nissan Leaf



2019 Jaguar I-PACE

*Coming
Soon!*



2019 Audi e-tron



2020 Tesla Model Y – Front & Rear



NEW

Inverter Benchmark & Cost Report

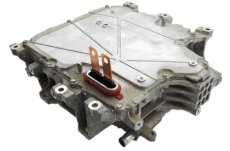
\$36,000 USD

(Tesla Model 3, Nissan Leaf, and Jaguar I-Pace)

Munro's Inverter Report provides a detailed analysis of Battery Electric Vehicles (BEV) inverters.

The Benchmark Report is highly advantageous for OEMs or suppliers looking to effectively expand and compete in new EV markets.

The report is a comprehensive analysis of each Inverter. This report contains descriptive and pictorial detail on every facet of the inverters' dimensional data, manufacturing processes, schematics, block diagrams and detailed cost analysis.



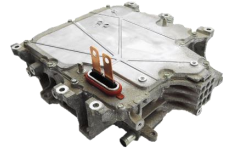
Inverter Benchmark Report Content

- ❖ Those who purchase the report will receive a single report containing:
 - a. Executive Summary
 - b. Side by Side Summary
 - c. Inverter views, dimensions, mounting approach, cooling strategy
 - d. PCB circuit diagrams, schematics and block diagrams
 - e. PCB bill of material
 - f. Costed Bill of Material

Component	Cost	Weight (kg)
Tesla Model 3 Inverter	\$ xxxx	4.81
Nissan Leaf Inverter	\$ xxxx	11.14
Jaguar I-Pace Inverter	\$ xxxx	8.10

* Cost and weights include: Housing, PCBA, IGBT Module & Cooling Structure, DC-link Capacitor, Motor Phase Lead, Connectors, Self-contained structural and connected components.

This material is trade marked proprietary of Munro & Associates Inc®



Inverter Costed Bill of Material

- ❖ The costed bill of materials (CBOM) are a consolidated view of the cost information presented in the reports. A CBOM report is included for each inverter analyzed in PDF format.
- ❖ The CBOM and media BOM are an indented format and include:
 - Part Name
 - Part Number
 - Material
 - Total Cost
 - Weight
 - Quantity
 - Total Weight

Tesla Model 3 Inverter - CBOM

Level	Type	Name	Number	Material Name	Total Cost* (Each)	Qty	Total Cost*
3	Process	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	_PA66 GF-30	\$0.06	1	\$0.06
4	Process	Process TM3 Plastic Shield 1, Busbar FETs to Cap	×	×	\$0.06	1	\$0.06
3	Process	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	_PA66 GF-30	\$0.04	1	\$0.04
4	Process	Process TM3 Plastic Shield 2, Busbar FETs to Cap	×	×	\$0.04	1	\$0.04
3	Process	Assemble Bus Bar, FETs to Capacitor Bank	×	×	\$0.39	1	\$0.39
2	Process	TM3 Phase Lead Terminal Assembly	Multiple	Multiple	\$7.63	1	\$7.63

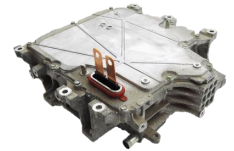
This material is trademarked p

Tesla Model 3 Inverter - Media BOM

Name	Number	Material	Weight (g)	Quantity
Media: Timing Crystal	TM3LPTXL02160R	Commodity Item	0.0000	1
Media: LDO Regulator 8-Pin VSGOP	TMG LM2009QW-5.0/NOPB	Commodity Item	0.0000	1
Media: Precision Monopower Series Voltage Reference, SOT	TMG LM4128D-1.2/NOPB	Commodity Item	0.0000	1
Media: Quad Operational Amplifier, 14-Pin SOIC	TMG LMV344M/NOPB	Commodity Item	0.0000	1
Media: IC Operational Amplifier GP 2.7V/12 RRD-ESD	TMG LT1494GMSR#F	Commodity Item	0.0000	1
Media: Diode Schottky 40V 1A Automotive 2-Pin SOD-123FL	TMG MBR145FT3G	Commodity Item	0.0000	1
Media: Trans Darlington PNP 100V 8A3 Pin-Q-Flat DPAK	TMG MJD12TG	Commodity Item	0.0000	6

This material is trademarked proprietary of Munro & Associates Inc®

Please Note: The costed bill of material is provided in pictorial / PDF format and will not be available in Excel.



Cost Estimates

- ❖ The costs of the inverters include the housings and the internal electrical componentry. Munro used their proprietary software and methodologies to establish a should-cost to manufacture the various parts found in each inverter.
- ❖ Cost models are established by disassembling and analyzing the inverter assemblies. The components are documented in detail, capturing the assembly operations and weight. Costs are assigned to materials, purchased parts, and processes.
- ❖ All the inverters are costed with the USA as the country of origin.

Level	Type	Name	Quantity	Material Name	Total Cost* (Each)	Qty	Total Cost**
3	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	1	FAB6 GF-30	\$0.06	1	\$0.06
4	Process TM3 Plastic Shield 1, Busbar FETs to Cap		1		\$0.04	1	\$0.04
3	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	1	FAB6 GF-30	\$0.04	1	\$0.04
4	Process TM3 Plastic Shield 2, Busbar FETs to Cap		1		\$0.04	1	\$0.04
3	Assemble Bus Bar, FETs to Capacitor Bank		1		\$0.29	1	\$0.29
2	TM3 Phase Lead Terminal Assembly	TM3 Phase Lead Terminal Assembly	Multiple		\$7.63	1	\$7.63
3	TM3 Phase Lead Terminal Overmold	TM3 Phase Lead Terminal Overmold	Multiple		\$4.36	1	\$4.36
4	TM3 Phase Lead Terminal 1	TM3 Phase Lead Terminal 1	Multiple		\$2.27	1	\$2.27
5	Process TM3 Phase Lead Terminal Out 1	TM3 Phase Lead Terminal Out 1	Multiple	Copper Alloy C11000 - Cold	\$0.96	1	\$0.96

Inverter / Converter

24 April 2020 Copyright © Munro & Associates, Inc. 2018

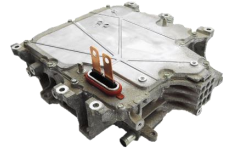
Assembly Summary

Zone	Zone 4: Powertrain & Battery Pack
System	Inverter / Converter
Part	Inverter Converter Module Assy, HV Motor

Disclaimers

Legal Disclaimer: All company names, product names, and service names mentioned are used for identification purposes only and may be registered trademarks, trademarks, or service marks of their respective owners. All analyses are done without participation, authorization, or endorsement of the manufacturer. Any cost analyses presented in this material are estimates prepared by Munro & Associates, Inc. These estimates reflect the probable costs. The actual producer did not supply the data, and therefore the actual costs may differ from these estimates. Furthermore, Munro & Associates, Inc. extends no warranties with respect to any information in this document and shall bear no liability whatsoever for the use of the information. Copyright © 2018 Munro & Associates, Inc. All rights reserved. Do not reproduce, distribute, disseminate, photocopy, fax, transmit, download to a shared database, or otherwise copy, transfer, sell, publish, or send this material, or any portion thereof, by any means without the express written permission of Munro & Associates Inc. under penalty of law.

Technical Disclaimer: The goal of this analysis is to establish a should cost value for manufacturing the vehicle and its sub-systems. These cost totals do not include tooling, Engineering Research and Development (ER&D), testing and calibration, or logistics.



FAQ (Frequently Asked Questions)

- ❖ Was Tesla or any other OEM involved in the study?
No. Neither the OEMs' proprietary costs nor any supplier's quoted costs were used in this study.
- ❖ Is there any OEM proprietary (stolen) IP in this report?
No. All data was developed through Munro's proven methodologies, analyzing Munro's purchased production Tesla vehicles and other OEMs' components
- ❖ Are the components costed using USMCA costing centers?
Yes, Munro includes labor, factory floor cost, taxes and SG&A for OEM or Tier Suppliers.
- ❖ Is this a Costing or Pricing report?
This is a Costing Report. Pricing has too many variables.

Legal Disclaimers & Sales Condition

- ❖ How can I see the sample report before purchasing?
Please contact your regional Munro salesperson. They can provide sample information in digital PDF format NOTE: critical data will be hidden in the sample.
- ❖ Is Purchaser allowed to Reproduce, Distribute, Disseminate, Photocopy, Fax, or Transmit report content internally within the Purchaser's organization?
Yes, ONLY INTERNAL Company correspondence is authorized.
NOTE: The purchasing company shall not be legally permitted to reproduce, distribute, disseminate, photocopy, fax, transmit, sell, publish, or send this material, or any portion thereof, by any means without the express written permission of Munro & Associates Inc. under penalty of law. The reports are Copyright Protected.
- ❖ If questions arise, is a Munro expert able to visit and explain the report's details?
It is not included in the price of report.
A Munro associate will visit if the customer pays for the travel and a daily fee.
- ❖ If there are limited specific questions on the content of report, is it possible for a Munro representative to support phone or e-mail communication?
Yes, please contact the local area salesperson and we will respond with our answers.