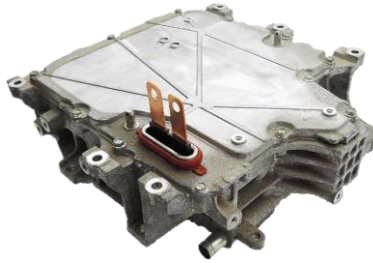




2018 Tesla Model 3



2019 Nissan Leaf



2019 Jaguar I-PACE

*Coming
Soon!*



2019 Audi e-tron



2020 Tesla Model Y – Front & Rear



NEW

Inverter Benchmark & Cost Report

Email: Sales@leandesign.com for a quote!
(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

Tesla Model 3- In Depth Electronic Analysis
Inverter Circuit Block Diagram

Tesla Model 3- In Depth Electronic Analysis
Schematic Deep Dive

Tesla Model 3- Inverter Electronic Analysis

Tesla Model 3- Inverter Architecture

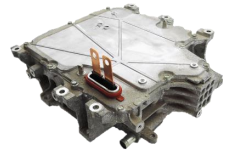
Side-by-Side Comparison
Battery Electric Vehicles (BEV)- Inverter

Side-by-Side Comparison
Electric Drive- PM Motor

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

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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	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	\$0.06	1	\$0.06
4	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank	\$0.06	1	\$0.06
3	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	\$0.04	1	\$0.04
4	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank	\$0.04	1	\$0.04
3	Assemble Bus Bar, FETs to Capacitor Bank	Assemble Bus Bar, FETs to Capacitor Bank	Assemble Bus Bar, FETs to Capacitor Bank	Assemble Bus Bar, FETs to Capacitor Bank	\$0.39	1	\$0.39
2	TM3 Phase Lead Terminal Assembly	TM3 Phase Lead Terminal Assembly	TM3 Phase Lead Terminal Assembly	TM3 Phase Lead Terminal Assembly	\$7.63	1	\$7.63
3	TM3 Phase Lead Terminal Overmold	TM3 Phase Lead Terminal Overmold	TM3 Phase Lead Terminal Overmold	TM3 Phase Lead Terminal Overmold			
4	TM3 Phase Lead Terminal 1	TM3 Phase Lead Terminal 1	TM3 Phase Lead Terminal 1	TM3 Phase Lead Terminal 1			
5	TM3 Phase Lead Terminal Out 1	TM3 Phase Lead Terminal Out 1	TM3 Phase Lead Terminal Out 1	TM3 Phase Lead Terminal Out 1			
6	Process TM3 Phase Lead Terminal Out 1	Process TM3 Phase Lead Terminal Out 1	Process TM3 Phase Lead Terminal Out 1	Process TM3 Phase Lead Terminal Out 1			
5	TM3 Phase Lead Terminal In 1	TM3 Phase Lead Terminal In 1	TM3 Phase Lead Terminal In 1	TM3 Phase Lead Terminal In 1			
6	Process TM3 Phase Lead Terminal In 1	Process TM3 Phase Lead Terminal In 1	Process TM3 Phase Lead Terminal In 1	Process TM3 Phase Lead Terminal In 1			
5	Assemble Phase Lead Terminal 1	Assemble Phase Lead Terminal 1	Assemble Phase Lead Terminal 1	Assemble Phase Lead Terminal 1			
4	TM3 Phase Lead Terminal 2	TM3 Phase Lead Terminal 2	TM3 Phase Lead Terminal 2	TM3 Phase Lead Terminal 2			
5	TM3 Phase Lead Terminal Out 2	TM3 Phase Lead Terminal Out 2	TM3 Phase Lead Terminal Out 2	TM3 Phase Lead Terminal Out 2			
6	Process TM3 Phase Lead Terminal Out 2	Process TM3 Phase Lead Terminal Out 2	Process TM3 Phase Lead Terminal Out 2	Process TM3 Phase Lead Terminal Out 2			
5	TM3 Phase Lead Terminal In 2	TM3 Phase Lead Terminal In 2	TM3 Phase Lead Terminal In 2	TM3 Phase Lead Terminal In 2			
6	Process TM3 Phase Lead Terminal In 2	Process TM3 Phase Lead Terminal In 2	Process TM3 Phase Lead Terminal In 2	Process TM3 Phase Lead Terminal In 2			
5	Assemble Phase Lead Terminal 2	Assemble Phase Lead Terminal 2	Assemble Phase Lead Terminal 2	Assemble Phase Lead Terminal 2			
4	TM3 Phase Lead Terminal 3	TM3 Phase Lead Terminal 3	TM3 Phase Lead Terminal 3	TM3 Phase Lead Terminal 3			
5	TM3 Phase Lead Terminal Out 3	TM3 Phase Lead Terminal Out 3	TM3 Phase Lead Terminal Out 3	TM3 Phase Lead Terminal Out 3			
6	Process TM3 Phase Lead Terminal Out 3	Process TM3 Phase Lead Terminal Out 3	Process TM3 Phase Lead Terminal Out 3	Process TM3 Phase Lead Terminal Out 3			
5	TM3 Phase Lead Terminal In 3	TM3 Phase Lead Terminal In 3	TM3 Phase Lead Terminal In 3	TM3 Phase Lead Terminal In 3			
6	Process TM3 Phase Lead Terminal In 3	Process TM3 Phase Lead Terminal In 3	Process TM3 Phase Lead Terminal In 3	Process TM3 Phase Lead Terminal In 3			
5	Assemble Phase Lead Terminal 3	Assemble Phase Lead Terminal 3	Assemble Phase Lead Terminal 3	Assemble Phase Lead Terminal 3			
4	Overmold Phase Lead Terminal	Overmold Phase Lead Terminal	Overmold Phase Lead Terminal	Overmold Phase Lead Terminal			
3	TM3 Plastic Shield 2, Phase Lead Term	TM3 Plastic Shield 2, Phase Lead Term	TM3 Plastic Shield 2, Phase Lead Term	TM3 Plastic Shield 2, Phase Lead Term			
4	Process TM3 Plastic Shield 2, Phase Lead	Process TM3 Plastic Shield 2, Phase Lead	Process TM3 Plastic Shield 2, Phase Lead	Process TM3 Plastic Shield 2, Phase Lead			
3	Assemble Phase Lead Terminal	Assemble Phase Lead Terminal	Assemble Phase Lead Terminal	Assemble Phase Lead Terminal			
2	Assemble SIC MOSFET and HV Capacitor	Assemble SIC MOSFET and HV Capacitor	Assemble SIC MOSFET and HV Capacitor	Assemble SIC MOSFET and HV Capacitor			

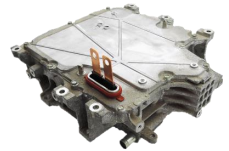
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Tesla Model 3 Inverter - Media BOM

Name	Number	Material	Weight (Lb)	Quantity
Media:				
Tuning Crystal	TM3_LXTAL_02148744	Commodity Item	0.0000	1
LOO Regulator 8 Pin VSGOP	TM3_LX200QNM_6.5NOPS	Commodity Item	0.0000	1
Media:				
Precision Monopower Series Voltage Reference, SOT	TM3_UX12180_1MFS_3NOPS	Commodity Item	0.0000	1
Media:				
Quad Operational Amplifier, 14 Pin SOIC	TM3_UX1544QMANOPS	Commodity Item	0.0000	1
Media:				
IC Operational Amplifier OP 2.7VHZ RHD 850	TM3_LT1454HGBPST	Commodity Item	0.0000	1
Media:				
Diode Schottky 40V 1A Automotive 2 Pin SOD-123FL	TM3_M81R145FT3G	Commodity Item	0.0000	1
Media:				
Trans Darlingtn PNP 100V 5A3 Pin(2-Tail) DP4K	TM3_NLD121G	Commodity Item	0.0000	8

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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.

Tesla Model 3 Inverter - CBOM

Level	Type	Name	Quantity	Material Name	Total Cost* (Each)	Qty	Total Cost*
3	1	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	1	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	\$0.06	1	\$0.06
4	1	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank	1	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank	\$0.04	1	\$0.04
3	1	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	1	TM3 Plastic Shield 2, Busbar FETs to Cap Bank	\$0.04	1	\$0.04
4	1	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank	1	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank	\$0.04	1	\$0.04
2	1	Assembly Bus Bar, FETs to Capacitor Bank	1	Assembly Bus Bar, FETs to Capacitor Bank	\$0.29	1	\$0.29
2	1	TM3 Phase Lead Terminal Assembly	1	TM3 Phase Lead Terminal Assembly	\$7.63	1	\$7.63
3	1	TM3 Phase Lead Terminal Overmold	1	TM3 Phase Lead Terminal Overmold	\$4.96	1	\$4.96
4	1	Process TM3 Phase Lead Terminal Overmold	1	Process TM3 Phase Lead Terminal Overmold	\$2.27	1	\$2.27
5	1	TM3 Phase Lead Terminal Out 1	1	TM3 Phase Lead Terminal Out 1	\$0.96	1	\$0.96
6	1	Process TM3 Phase Lead Terminal Out 1	1	Process TM3 Phase Lead Terminal Out 1	\$0.96	1	\$0.96

Inverter / Converter



Assembly Summary

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

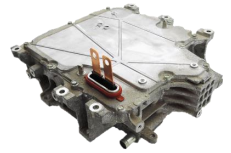
Supplier Name/Code

Disclaimers

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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.

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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.

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Yes, please contact the local area salesperson and we will respond with our answers.