



2018 Tesla Model 3



2019 Nissan Leaf



2019 Jaguar I-PACE



2019 Audi e-tron



2020 Tesla Model Y  
Front



2020 Tesla Model Y  
Rear

**NEW**

## Inverter Benchmark & Cost Report

**Email: [Sales@leandesign.com](mailto:Sales@leandesign.com) a quote!**

***Tesla Model 3, Nissan Leaf, Jaguar I-Pace,  
Audi e-tron, Tesla Model Y front and rear***

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**

TMS320F28377, LT1494H

**Tesla Model 3- Inverter Architecture**

Phase Lead Terminal

**Side-by-Side Comparison**

Battery Electric Vehicles (BEV)- Inverter

**Side-by-Side Comparison**

Electric Drive- PM Motor

Model	Image	Cost	Weight (kg)
Tesla M3 (Rear)		\$xxx.xx	x.xx
Tesla MY (Rear)		\$xxx.xx	x.xx
Jaguar I-PACE		\$x,xxx	x.xx
Nissan Leaf		\$x,xxx	x.xx

• 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	Process	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	TM3 Plastic Shield 1, Busbar FETs to Cap Bank	_FA66 GF-30	\$0.06	1	\$0.06
4	Process	Process TM3 Plastic Shield 1, Busbar FETs to Cap Bank		X	\$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	_FA66 GF-30	\$0.04	1	\$0.04
4	Process	Process TM3 Plastic Shield 2, Busbar FETs to Cap Bank		X	\$0.04	1	\$0.04
3	Process	Assemble Bus Bar, FETs to Capacitor Bank		X	\$0.39	1	\$0.39
2	Process	TM3 Phase Lead Terminal Assembly	TM3 Phase Lead Terminal Assembly	Multiple	\$7.63	1	\$7.63
3	Process	TM3 Phase Lead Terminal Overmold					
4	Process	TM3 Phase Lead Terminal 1					
5	Process	TM3 Phase Lead Terminal Out 1					
6	Process	Process TM3 Phase Lead Terminal Out 1					
5	Process	TM3 Phase Lead Terminal In 1					
6	Process	Process TM3 Phase Lead Terminal In 1					
5	Process	Assemble Phase Lead Terminal 1					
4	Process	TM3 Phase Lead Terminal 2					
5	Process	TM3 Phase Lead Terminal Out 2					
6	Process	Process TM3 Phase Lead Terminal Out 2					
5	Process	TM3 Phase Lead Terminal In 2					
6	Process	Process TM3 Phase Lead Terminal In 2					
5	Process	Assemble Phase Lead Terminal 2					
4	Process	TM3 Phase Lead Terminal 3					
5	Process	TM3 Phase Lead Terminal Out 3					
6	Process	Process TM3 Phase Lead Terminal Out 3					
5	Process	TM3 Phase Lead Terminal In 3					
6	Process	Process TM3 Phase Lead Terminal In 3					
5	Process	Assemble Phase Lead Terminal 3					
4	Process	Overmold Phase Lead Terminal					
3	Process	TM3 Plastic Shield 2, Phase Lead Term					
4	Process	Process TM3 Plastic Shield 2, Phase Lead					
3	Process	Assemble Phase Lead Terminal					
2	Process	Assemble SiC MOSFET and HV Capacitor					

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**Tesla Model 3 Inverter - Media BOM**

Name	Number	Material	Weight (Lb)	Quantity
<b>Media:</b> Timing Crystal	TM3_LXTAL_0016750e	Connectivity Item	0.0050	1
<b>Media:</b> LDO Regulator 8-Pin V550P	TM3_LN200Q04H_65_NCP8	Connectivity Item	0.0000	1
<b>Media:</b> Precision Monopower Series Voltage Reference, SOT	TM3_LM43180_1M3_3NCP5	Connectivity Item	0.0000	1
<b>Media:</b> Quad Operational Amplifier, 14-Pin, SOIC	TM3_LN74V442M_NCP8	Connectivity Item	0.0000	1
<b>Media:</b> IC Operational Amplifier OP 2.7VHZ 800-830	TM3_LT1364_038P5F	Connectivity Item	0.0000	1
<b>Media:</b> Diode Schottky 40V 1A Automotive 2-Pin SOD-123FL	TM3_MBR145FT35	Connectivity Item	0.0000	1
<b>Media:</b> Trans Darlington PNP 100V 6A3 Pin(HT) DPAK	TM3_NU01235	Connectivity 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	Blindcode	Material Name	Unit Cost*	Qty	Total Cost*
3		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 TM3 Plastic Shield 1, Busbar FETs to Cap			\$0.04	1	\$0.04
3		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 TM3 Plastic Shield 2, Busbar FETs to Cap			\$0.04	1	\$0.04
3		Assemble Bus Bar, FETs to Capacitor Bank			\$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	\$6.98	1	\$6.98
4		Process 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	Copper Alloy C11000 - Cold	\$5.98	1	\$5.98

**Inverter / Converter**

**Assembly Summary**

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

Supplier Name/Code

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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.





## 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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