

## J APPLICATIONS OF VISRAG

To demonstrate the applications of VisRAG, we present three possible use cases, as detailed in Table 14, Table 15, and Table 16. For each use case, we select a PDF from the Internet to serve as the knowledge corpus and index its content using VisRAG. We then pose a query to evaluate whether VisRAG can accurately retrieve the relevant pages from the PDF and generate a correct answer.

In all cases, VisRAG successfully identifies the correct source pages and provides accurate answers. Notably, in Table 16, VisRAG retrieves the specific page containing the table with the required information and extracts the correct answer from it. These results demonstrate that VisRAG is highly effective in meeting users’ tailored information needs when working with specific documents.

Table 14: A use case of VisRAG where the corpus is Tesla’s Model X Owner’s Manual.




	<b>VisRAG</b>
<b>Document Title</b>	Model X Owner’s Manual
<b>URL</b>	<a href="https://www.tesla.com/ownersmanual/modelx/en_us/Owners_Manual.pdf">https://www.tesla.com/ownersmanual/modelx/en_us/Owners_Manual.pdf</a>
<b>Number of Pages</b>	310
<b>Query</b>	How should a pregnant person properly wear a seat belt in a Tesla Model X?
<b>Retrieved Top-1 Document</b>	<div><div><div><div><div></div><div><b>Seat Belts</b></div></div><div><p>4. Without pressing the button, pull on the seat belt webbing and attempt to move the shoulder anchor downward to check that it is locked into position.</p><p><b>WARNING:</b> Ensure that the seat belt is positioned correctly and that the shoulder anchor is locked into position before driving. Riding in a moving vehicle with the seat belt positioned incorrectly or with the shoulder anchor not locked into position can reduce the effectiveness of the seat belt in a collision.</p><p><b>To Release a Belt</b></p><p>Hold the belt near the buckle to prevent the belt from retracting too quickly, then press the button on the buckle. The belt retracts automatically. Ensure there is no obstruction that prevents the belt from fully retracting. The belt should not hang loose. If a seat belt does not fully retract, contact Tesla.</p><p><b>Wearing Seat Belts When Pregnant</b></p><p>Do not put the lap or shoulder sections of the seat belt over the abdominal area. Wear the lap section of the belt as low as possible across the hips, not the waist. Position the shoulder portion of the belt between the breasts and to the side of the abdomen. Consult your doctor for specific guidance.</p></div><div><div><p><b>WARNING:</b> If the seat belt is uncomfortable, adjust the seating position instead of wearing the seat belt incorrectly.</p><p><b>WARNING:</b> Never place anything between you and the seat belt to cushion the impact in the event of a collision.</p></div></div></div><div><div><div><b>Seat Belt Pre-tensioners</b></div><div><p>The front seat belts are equipped with pre-tensioners that work in conjunction with the airbags in a collision. The pre-tensioners automatically retract both the seat belt lower anchor and the upper shoulder webbing, reducing slack in both the lap and diagonal portions of the belts, resulting in reduced forward movement of the occupant.</p></div><div><p>If the pre-tensioners and airbags did not activate in an impact, this does not mean they malfunctioned. It usually means that the strength or type of force needed to activate them was not present.</p><p>The second row outboard seats are equipped with shoulder pre-tensioners to retract the seat belt webbing to reduce forward movement of the occupant.</p><p><b>WARNING:</b> Do not bend, sit on, or interfere with the pre-tensioner assembly. Doing so can cause damage that interferes with the proper functionality of the seat belt system.</p><p><b>WARNING:</b> Once the seat belt pre-tensioners have been activated, they must be replaced. After any collision, have the airbags, seat belt pre-tensioners and any associated components checked and, if necessary, replaced.</p><div><b>Testing Seat Belts</b></div><p>To confirm that seat belts are operating correctly, perform these checks on each seat belt.</p><p>1. With the seat belt fastened, give the webbing nearest the buckle a quick and forceful pull. The buckle should remain securely locked.</p></div></div></div></div><div>48</div><div>MODEL X Owner's Manual</div></div>
<b>Answer</b>	A pregnant person should wear the seat belt in a Tesla Model X by ensuring that the lap section of the belt is positioned as low as possible across the hips, not the waist. The shoulder portion of the belt should be placed between the breasts and to the side of the abdomen. It is important to consult with a doctor for specific guidance regarding seat belt positioning during pregnancy. ✓ <b>Correct</b>

Table 15: A use case of VisRAG where the corpus is Tesla’s Model X Owner’s Manual.




	VisRAG
<b>Document Title</b>	Model X Owner’s Manual
<b>URL</b>	<a href="https://www.tesla.com/ownersmanual/modelx/en_us/Owners_Manual.pdf">https://www.tesla.com/ownersmanual/modelx/en_us/Owners_Manual.pdf</a>
<b>Number of Pages</b>	310
<b>Query</b>	How can I charge my Tesla Model X?
<b>Retrieved Top-1 Document</b>	<div> <div> <h3>Opening the Charge Port</h3> <p>The charge port is located on the left side of Model X, behind a door that is part of the rear tail light assembly. Park Model X to ensure that the charge cable easily reaches the charge port.</p> <p>With Model X in Park, press and release the button on the Tesla charge cable to open the charge port door.</p>  <p>You can also open the charge port door using any of these methods:</p> <ul style="list-style-type: none"> <li>• On the touchscreen, touch <b>Controls</b> and touch the Charge Port icon (lightning bolt).</li> <li>• On the touchscreen, navigate to <b>Controls &gt; Charging &gt; Open Charge Port</b>.</li> <li>• Press the charge port door when Model X is unlocked and an authenticated phone is nearby.</li> <li>• On the key fob, hold down the rear trunk button for 1-2 seconds.</li> <li>• When the vehicle is locked with an authenticated key in range, you can also press the button on the charge cable to open the charge port door (see <a href="#">Keys</a> on page 25).</li> <li>• Use voice commands to open the charge port door (see <a href="#">Voice Commands</a> on page 21). You can also use voice commands to close the charge port door, and begin or stop charging.</li> </ul> <p><b>NOTE:</b> The following image is provided for demonstration purposes only. Depending on market region and date of manufacture, your charge port may be slightly different.</p>  <p>Charging and Energy Consumption</p> </div> <div> <h3>Charging Instructions</h3> <p><b>NOTE:</b> The charge port lights up white when you open the charge port door. If you do not insert a charge cable into the charge port within a few minutes after opening the charge port door, the charge port door closes. If this happens, use the touchscreen to open the charge port door again.</p> <p><b>NOTE:</b> In extremely cold weather or icy conditions, it is possible that your charge port latch may freeze in place. In cases where you cannot remove or insert the charge cable, or the vehicle is not Supercharging due to the latch being frozen in place, use your Tesla mobile app to precondition your vehicle on <b>HI</b> for approximately 30-45 minutes (you must use your mobile app to precondition the vehicle; setting your climate to <b>HI</b> using the touchscreen is not effective). This can help thaw ice on the charge port latch so the charge cable can be removed or inserted.</p> <p><b>CAUTION:</b> Do not try to force the charge port door open.</p> <h3>Plugging In</h3> <p>If desired, use the touchscreen to change the charge limit and the charging current (see <a href="#">Charge Settings</a> on page 190).</p> <p>To charge at a public charging station, plug the appropriate adapter into the vehicle’s charging port, and then connect the station’s charging connector to the adapter. The most commonly used adapter(s) for each market region are provided. Depending on the charging equipment you are using, you may need to start and stop charging using a control on the charging equipment.</p> <p>If you are using the Mobile Connector, plug into the power outlet before plugging in Model X.</p> <p>Align the connector to the charge port and insert fully. When the connector is properly inserted, charging begins automatically after Model X:</p> <ul style="list-style-type: none"> <li>• Engages a latch that holds the connector in place;</li> <li>• Shifts into Park (if it was in any other drive mode);</li> <li>• Heats or cools the Battery, if needed. If the Battery requires heating or cooling, you may notice a delay before charging begins.</li> </ul> </div> </div>
<b>Answer</b>	<p>To charge your Tesla Model X, you can open the charge port door using various methods such as touching Controls and then touch Charge Port icon on the touchscreen, navigating to Controls &gt;Charging &gt;Open Charge Port on the touchscreen, pressing the charge port door when unlocked with an authenticated phone nearby, or by voice commands. Once the port is opened, connect the appropriate adapter(s) into the vehicle’s charging port and then attach it to the station’s charging connector. For public charging stations, ensure you’re using a commonly used adapter for your market region. If using the Mobile Connector, plug it into the power outlet before plugging in the Model X. ✓ <b>Correct</b></p>

Table 16: A use case of VisRAG where the corpus is Datasheet of 40MX and 42MX FPGA.

	VisRAG																																																																																																																																																											
Document Title	Datasheet of 40MX and 42MX FPGA																																																																																																																																																											
URL	https://download.datasheets.com/pdfs/2017/9/7/14/44/51/207/mcs_/manual/4367995729119819130699-ds2136-40mx-and-42mx-fpga-families-datasheet.pdf																																																																																																																																																											
Number of Pages	173																																																																																																																																																											
Query	What are the temperature grade offerings for A42MX09 in PLCC 84 packaging?																																																																																																																																																											
Retrieved Top-1 Document	<div>40MX and 42MX FPGA Families</div> <div></div> <div>2.6 Temperature Grade Offerings</div> <div>Table 4 • Temperature Grade Offerings</div> <table><tr><th>Package</th><th>A40MX02</th><th>A40MX04</th><th>A42MX09</th><th>A42MX16</th><th>A42MX24</th><th>A42MX36</th></tr><tr><td>PLCC 44</td><td>C, I, M</td><td>C, I, M</td><td></td><td></td><td></td><td></td></tr><tr><td>PLCC 68</td><td>C, I, A, M</td><td>C, I, M</td><td></td><td></td><td></td><td></td></tr><tr><td>PLCC 84</td><td></td><td>C, I, A, M</td><td>C, I, A, M</td><td>C, I, M</td><td>C, I, M</td><td></td></tr><tr><td>PQFP 100</td><td>C, I, A, M</td><td>C, I, A, M</td><td>C, I, A, M</td><td>C, I, M</td><td></td><td></td></tr><tr><td>PQFP 144</td><td></td><td></td><td>C, I</td><td></td><td></td><td></td></tr><tr><td>PQFP 160</td><td></td><td></td><td>C, I, A, M</td><td>C, I, M</td><td>C, I, A, M</td><td></td></tr><tr><td>PQFP 208</td><td></td><td></td><td></td><td>C, I, A, M</td><td>C, I, A, M</td><td>C, I, A, M</td></tr><tr><td>PQFP 240</td><td></td><td></td><td></td><td></td><td></td><td>C, I, A, M</td></tr><tr><td>VQFP 80</td><td>C, I, A, M</td><td>C, I, A, M</td><td></td><td></td><td></td><td></td></tr><tr><td>VQFP 100</td><td></td><td></td><td>C, I, A, M</td><td>C, I, A, M</td><td></td><td></td></tr><tr><td>TQFP 176</td><td></td><td></td><td>C, I, A, M</td><td>C, I, A, M</td><td>C, I, A, M</td><td></td></tr><tr><td>PBGA 272</td><td></td><td></td><td></td><td></td><td></td><td>C, I, M</td></tr><tr><td>CQFP 172</td><td></td><td></td><td></td><td>C, M, B</td><td></td><td></td></tr><tr><td>CQFP 208</td><td></td><td></td><td></td><td></td><td></td><td>C, M, B</td></tr><tr><td>CQFP 256</td><td></td><td></td><td></td><td></td><td></td><td>C, M, B</td></tr><tr><td>CPGA 132</td><td></td><td></td><td>C, M, B</td><td></td><td></td><td></td></tr></table> <div>Note: C = Commercial I = Industrial A = Automotive M = Military B = MIL-STD-883 Class B</div> <div>2.7 Speed Grade Offerings</div> <div>Table 5 • Speed Grade Offerings</div> <table><tr><th></th><th>-F</th><th>Std</th><th>-1</th><th>-2</th><th>-3</th></tr><tr><td>C</td><td>P</td><td>P</td><td>P</td><td>P</td><td>P</td></tr><tr><td>I</td><td></td><td>P</td><td>P</td><td>P</td><td>P</td></tr><tr><td>A</td><td></td><td>P</td><td></td><td></td><td></td></tr><tr><td>M</td><td></td><td>P</td><td>P</td><td></td><td></td></tr><tr><td>B</td><td></td><td>P</td><td>P</td><td></td><td></td></tr></table> <div>Note: See the 40MX and 42MX Automotive Family FPGAs datasheet for details on automotive-grade MX offerings. Contact your local Microsemi Sales representative for device availability.</div> <div>DS2316 Datasheet Revision 16.0</div> <div>7</div>	Package	A40MX02	A40MX04	A42MX09	A42MX16	A42MX24	A42MX36	PLCC 44	C, I, M	C, I, M					PLCC 68	C, I, A, M	C, I, M					PLCC 84		C, I, A, M	C, I, A, M	C, I, M	C, I, M		PQFP 100	C, I, A, M	C, I, A, M	C, I, A, M	C, I, M			PQFP 144			C, I				PQFP 160			C, I, A, M	C, I, M	C, I, A, M		PQFP 208				C, I, A, M	C, I, A, M	C, I, A, M	PQFP 240						C, I, A, M	VQFP 80	C, I, A, M	C, I, A, M					VQFP 100			C, I, A, M	C, I, A, M			TQFP 176			C, I, A, M	C, I, A, M	C, I, A, M		PBGA 272						C, I, M	CQFP 172				C, M, B			CQFP 208						C, M, B	CQFP 256						C, M, B	CPGA 132			C, M, B					-F	Std	-1	-2	-3	C	P	P	P	P	P	I		P	P	P	P	A		P				M		P	P			B		P	P		
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