TECH BRIEF

SWITCH CONNECTOR

molex

Introduction 3

SWITCH DESIGN REQUIREMENTS 4

MINI50, CONNTAK50 AND DURACLIK PRODUCT FEATURES 5

PRODUCT INFORMATION 7

The switch is one of the most common devices in a vehicle, and it controls a variety of functions, such as exterior rearview mirrors, start-stop engine systems, air-conditioning controls, drive select functions, power windows and more. A typical vehicle model may use around 20 switches, whereas a high-configuration model would use as many as 30 switches or more.

The switch can be divided into two categories — onload and offload — based on whether the switch powers up an appliance. In this regard, most of the switches used within a vehicle belong to the offload category. Typical offload switches include an instrument-combined switch, steering-wheel multi-function switch and so on, which require only a small electric current, generally no more than 50mA. The consistency of current creates favorable conditions for platform-based switch connector products.

The development of switching modules requires a combination of functional keys by vehicle model and configuration. Alternatively, the number of pins on a switch may vary according to the control strategy. Platform-based switch connectors, therefore, should offer a range of pin counts. It is our opinion that, in general, the number of switch pins should be between 2 and 20. On the other hand, in order to meet pin requirements for large, combined switches, the connector will need to support more than 30 pins.

Molex DuraClik, Mini50 and ConnTAK50 connectors can support platform-based switches, thanks to the wide variety of the product families, miniaturized terminals, and industry-standard interfaces.

SWITCH DESIGN REQUIREMENTS

Controlling Over-Signal Switching

A vehicle generally has 20 or so switches, most of which are offload switches. Onload switches, which typically include the following, are rarely seen:

- Power window switches
- Power seat switches

The majority of switches are offload types, which feature a low electric current and a wide variety of pin counts. A key often requires 1 to 2 pins for signal output. Therefore, the more keys a combined switch has, the more connector pins might be needed.

- Air-conditioning switch: 16 to 20 pins
- Dashboard combined switch: 8 to 12 pins
- Center armrest combined switch: 12 to 24 pins
- Steering wheel combined switch: 8 to 12 pins
- Trunk switch: 2 pins

Control over an offload switch is achieved via switching of a low-voltage electrical level, with these typical electric currents:

- LIN line control < 50mA
- Low-voltage switching < 30mA

Miniaturized, Lightweight

Switches and plug-ins are both miniaturized and lightweight to reduce materials and cost.

Platform-Based, Standardized

- Platform-based connectors offer ease of management due to the numerous switches.
- Consistent types of connectors drive economies of scale.
- Standardized interfaces reduce supply chain risk.

MINI50, CONNTAK50 AND DURACLIK PRODUCT FEATURES

Small-Current Connector

Small-terminal, small-current features help off-load connectors reduce performance waste.

- Mini50 Connectors, 4.0A current-carrying capability
- ConnTAK50 Connectors, 5.5A current-carrying capability
- DuraClik Connectors, 3.0A current-carrying capability

Pin / Blade Size	Current Capacity	Typ. Max Wire Size
0.5mm	3	0.35mm²
0.64mm	8	0.75mm²
1.2mm	13	1.0mm²
1.5mm	15	1.0mm²
2.8mm	23	3.0mm²
6.3mm	40	4.0mm²
9.5mm	60	10.0mm²

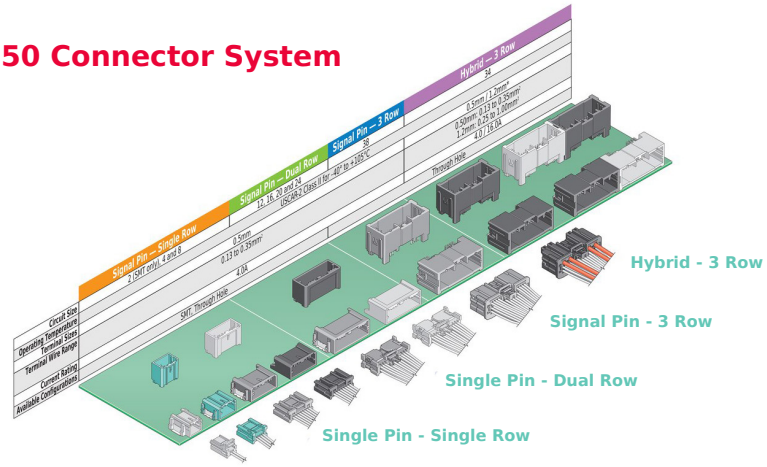
EWCAP Electric Current References

A Variety of Product Families With Large Coverage of Pin Counts

A variety of product families covers all requirements for switches, ranging from 2 to 38 pins.

- Mini50 Connectors: 2, 4, 8, 12, 16, 20, 24, 34 and 38 pins
- ConnTAK50 Connectors: 8, 10, 20 and 22 pins
- DuraClik Connectors: 2 to 15 pins

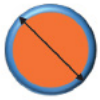
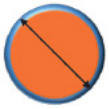
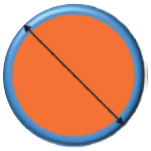
Mini50 Connector System



All board-end connectors provide both horizontal and vertical versions for different installation requirements. For application scenarios with integrated injection molding on the male side, Molex can also provide male mold opening sizes.

One of the Smallest Terminal Systems in the Industry

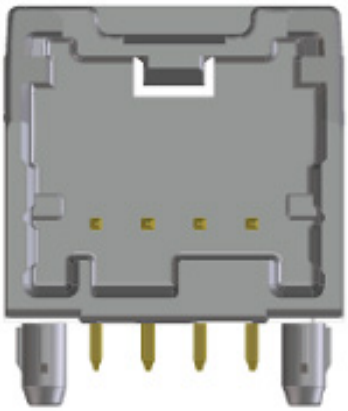
- The 0.50mm series represents one of the smallest terminal systems in the automotive industry, which is 50% smaller in footprint than the traditional 0.64mm product.
- The 0.13 to 0.35mm² range of conductor crimping; small-diameter conductor provides a lightweight harness, and the 0.13mm² conductor is 50% lighter than the 0.35mm² conductor.

Female Terminal Wire Range			
Wire Size	**0.13mm²**	**0.22mm²**	**0.35mm²**
Wire Name	**Thin Wall**	**Ultra Thin**	**Thin Wall**
Outer Diameter of Wire Insulation	 **1.05mm Max**	 **1.2mm Max**	 **1.4mm Max**
Recommended Grip Size	**Grip S**	**Grip M**	**Grip L**

USCAR and AK Standard Interfaces

The most widely accepted standard interfaces in the automotive industry:

- USCAR standard interface for Mini50 Connectors
- AK standard interface for ConnTAK50 Connectors



USCAR 1-by-4

Mini50 1-by-4

Mini50 Connectors

Board-End Series No.	Harness-End Series No.	Terminal Rows	Board-End Orientation	Type of Pins	Pins
34792	34791	Single	Vertical	Through-hole	4, 8
34793			Horizontal		
34912				SMT	2, 4, 8
34825	34824	Double	Vertical	Through-hole	12, 16, 20, 24
34826			Horizontal		
34897				SMT	
34958	34959	Triple	Vertical	Through-hole	34, 38
34961			Horizontal		

PERFORMANCE PARAMETERS

Terminal Plating	Tin
Contact Resistance (max.)	20 milliohms
Current-carrying Capability	4.0A
Crimping Diameter	0.13mm², 0.35mm²
Operating Voltage	14V
Operating Temperature	-40 to 105°C
Vibration Level	USCAR-2 V1
Insulating Resistance (min.)	100 Megaohms

DuraClik Connectors

Board-End Series No.	Harness-End Series No. TPA	Harness-End Series No. ISL	Board-End Orientation	Type of Pins	Pins
502352	505151	560123	Horizontal	SMT	2 to 15
560020			Vertical		

PERFORMANCE PARAMETERS

Terminal Plating	Tin
Contact Resistance (max.)	20 milliohms
Current-carrying Capability	3.0A
Crimping Diameter	0.13mm² to 0.35mm²
Operating Voltage	14V
Operating Temperature	-40 to 125°C
Vibration Level	44m/s²
Insulating Resistance (min.)	100 Megaohms

ConnTAK50 Connectors

Board-End Series No.	Harness-End Series No.	Terminal Rows	Board-End Orientation	Type of Pins	Pins
208033	205827	Single	Horizontal	SMT	2 to 6
208035			Vertical		
206958	205826	Double	Horizontal	SMT	8, 10, 20, 22
206957			Vertical		

PERFORMANCE PARAMETERS

Terminal Plating	Tin
Contact Resistance (max.)	25 milliohms
Current-carrying Capability	5.5A
Crimping Diameter	0.13mm² to 0.35mm²
Operating Voltage	14V
Operating Temperature	-40 to 105°C
Vibration Level	IEC60068-2-64 Body
Insulating Resistance (min.)	100 Megaohms

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