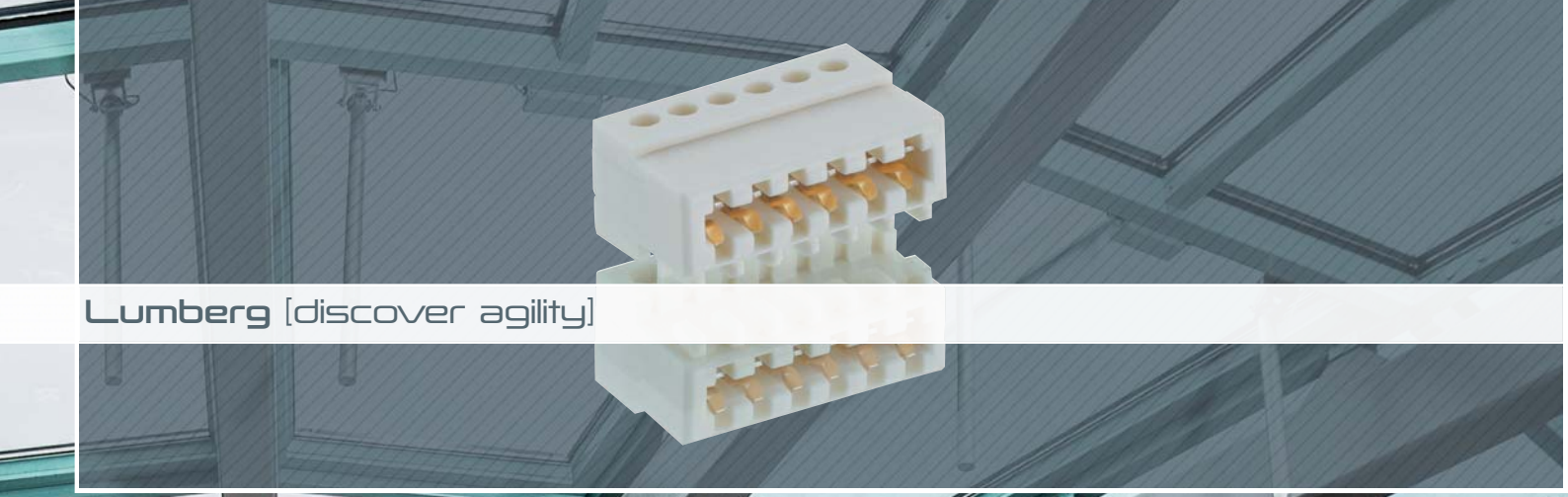
Lumberg

passion for connections

Automotive



Lumberg [discover agility]

Sustainability: Third Generation

at Lumberg

We are an independent, family-run company based in Germany – and have been for over 83 years now. Our success is based on sustainable performance, technical solution competence – and our "passion for connections".

With a track record of agile expertise, our products and systems solutions support an industrial environment – worldwide. We engineer and produce connectors and contact systems, electromechanical elements and mechatronic components of outstanding quality for your individual technical application. We focus on automotive, building technology, home appliances and mobile communications industries – let Lumberg put its decades of connector design and manufacturing experience to work for you.

ISO/TS 16949

St. Clair Technologies Overall Excellence

DIN EN ISO 9001

Ford Q1 Preferred Supplier

DIN EN ISO 14001

Brose Key Supplier

DIN EN ISO 50001

Bosch Preferred Supplier

Our team of experts in automotive

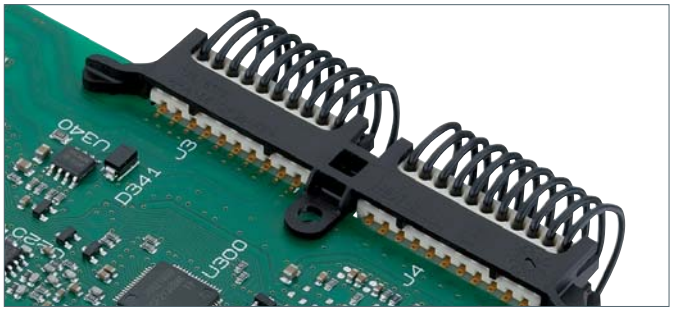
Competence in Providing Solutions [connecting the world of tomorrow]

R & D:
Value Creating Innovation

|by Lumberg

The right idea, straight construction, completely equipped laboratories and precise system measurements are the primary steps in our developing projects. According to state-of-the-art methods and technologies we mobilize our established development expertise and our passion for feasibility for your product.

And we continue to create innovative solutions and value in mechanical engineering and tool manufacturing for your individual, complex requirements. Our deep range of manufacture for key technologies renders us more flexible and faster for you.



- Tool construction and tool manufacturing for precision-compound dies and injection molding tools
- Proprietary machine and plant engineering for diverse customized production flows
- Proprietary software development for plant control systems
- Superior semi and fully-automatic manufacturing machinery

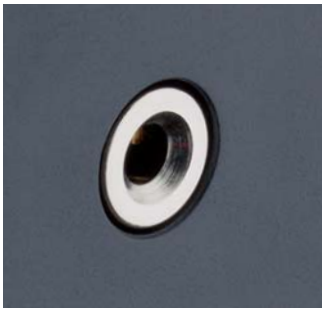
Direct Connectors and Infotainment [high-end interconnect systems]

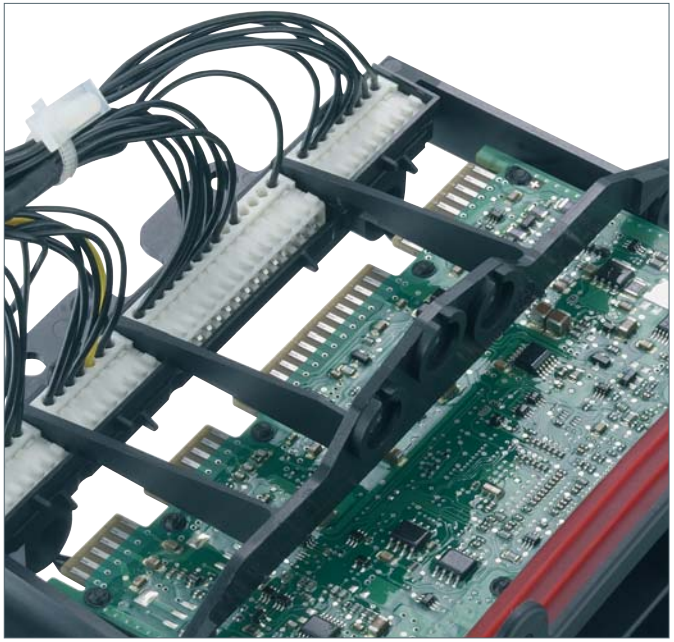
Quality: No Compromises

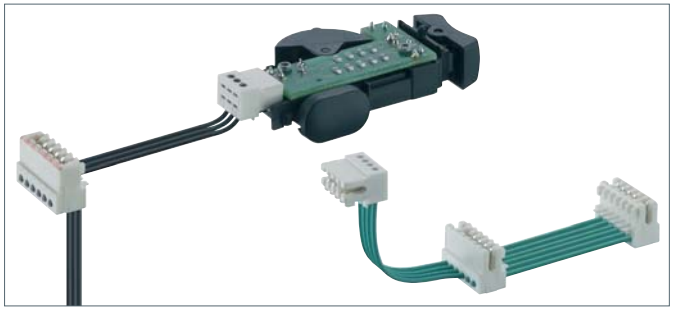
|by Lumberg

Connectors mating directly with the circuit board edge are highly beneficial when installation space is limited. We have implemented many space-saving applications using IDT in combination with modular direct mating systems, or even the respective guide frames for additional mechanical fixation or full modular assembly: the timely collaboration-based integration into your development processes is key here.

These days, infotainment is a must-have feature in every vehicle. We design superior aux-in interfaces with jack, RCA or USB sockets that match the vehicle's interior.







SmartSKEDD [IDT meets SKEDD]

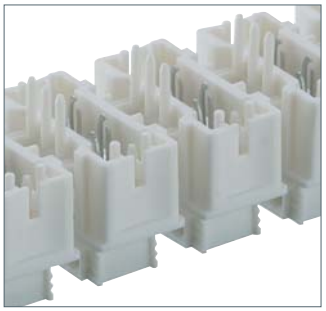
World Premiere: Arbitrary Direct Mating with PCB in IDT

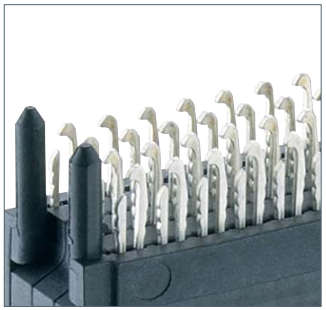
by Lumberg only

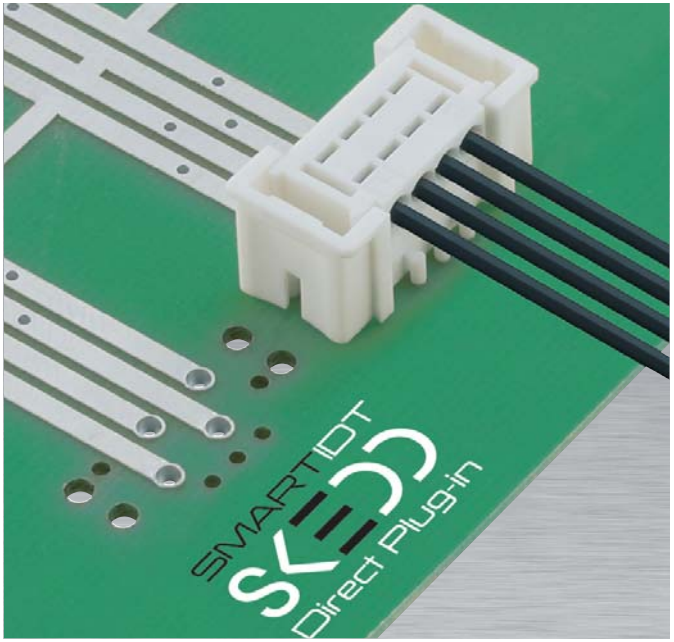
Solderless is the word that is electrifying connector technology in the automotive supply industry. While direct contacting to the edge of the printed circuit board with RAST connectors is one of our domains, and press-fit technology as an irreversible, solderless connection is our compulsory program, we are now harnessing a totally new type of connector for our free program: reversible direct connectors that mate anywhere on the printed circuit board, using tried and tested insulation displacement technology.

SKEDD technology makes this possible. The individual contact comprises two contact tongues which, when inserted into a plated-through hole in the PCB, retract evenly. The contact pressure forces from the two contact tongues then create a solderless, steadfast mechanical-electrical connection inside the plated-through hole.

In conjunction with the established insulation displacement technology, which is also growing rapidly within automotive electronics, and caters to both, automated cable assembly and the convenient production of large quantities, our unique combo for your ideas right in the middle of the PCB is really smart – or simply: SmartSKEDD.







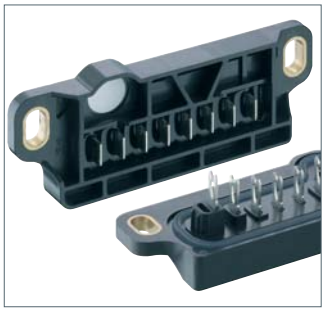
Electronic and Mechatronic Modules [cutting edge technology]

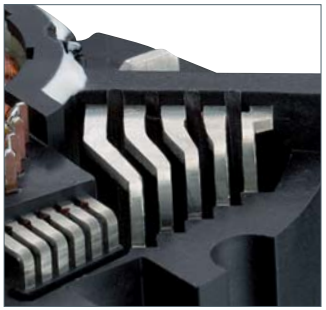
Combination: Metal-Plastics Sub-Assemblies

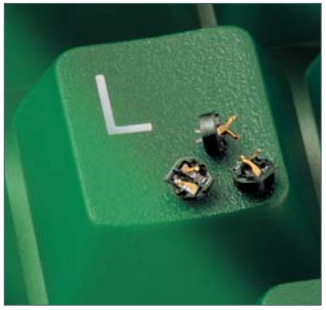
| by Lumberg

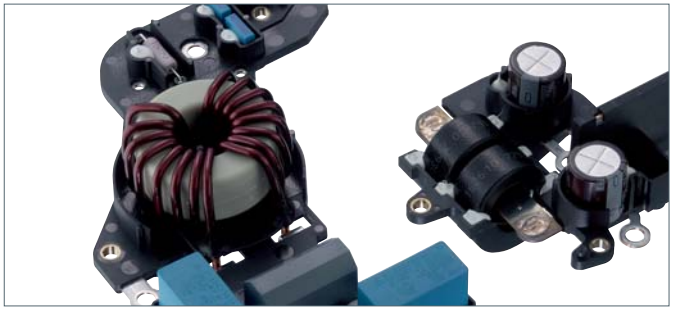
We stand for premium-class connectors. And for providing high-tech solutions based on advanced manufacturing equipment. Especially for metal-plastic compound assemblies combined with electronic components, this becomes cutting edge technology.

- System responsibility: proven competence with interconnect systems across electric drives, steering systems, engine management, air-control, power windows and LED technology
- Press-fit technology: tried and tested pin arrangements for solderless connections
- SmartSKEDD: direct, reversible contacting with direct connectors or custom-made sub-assemblies for anywhere on the printed circuit board
- Highest precision – filigree parts: We punch, injection mold and overmold components with a mass of a hundredth gram









Press-fit Technology [solderless connection]

Solutions: Customized

| by Lumberg

Press-fit technology is a superior solderless mechanical/electrical method with many benefits especially for the automotive industry. This connection is characterized by a defined deformation of the contact pins' press-fit zones whren pressed into the PCB's plated-through holes, as defined by IEC 60352-5.

This sealed, non-ageing connection eliminates corrosion and guarantees high mechanical stability. With improved FIT (Failure-in-Time) ratings of up to 30 times, this technology creates design opportunities and high packing densities for many automotive applications. The solderless method not only erases soldering costs: additionally, the PCB as well as adjacent components are no longer exposed to the stress caused from the high temperatures associated with soldering.

We precision-punch our press-fit contacts in-house and can customize them for use with your individual project, such as the integration into mechatronic sub-assemblies.

Space-saving – thanks to high packing densities

Design – individual

Processing – automatic

Connection – mechanical, durable, vibration-resistant

Technical Data see Page 25

System Partnership [collaborative performance]

Success: Shared Solution

| with Lumberg

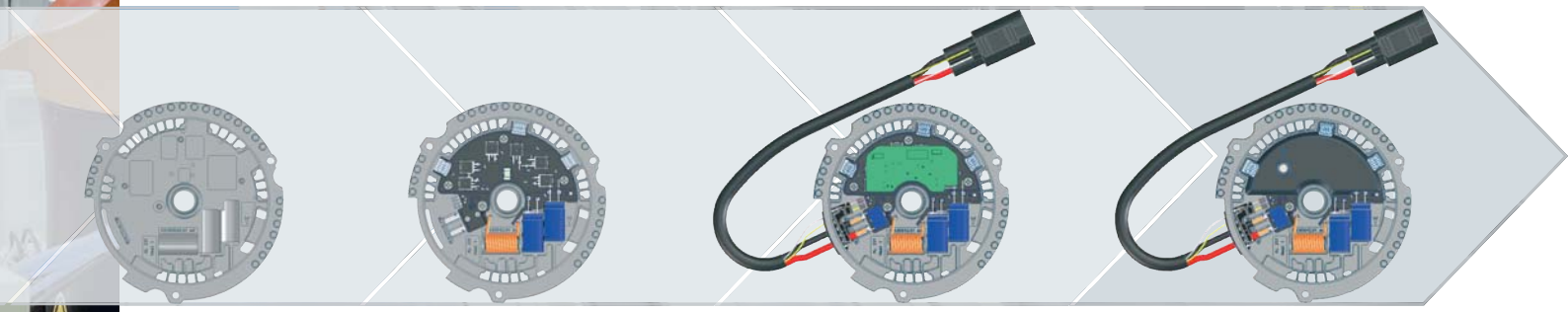
What started as a request for a lead frame with high current contacts evolved into a more deeply complex project, allowing us to apply many of our technological competences to meet the customer's demands.

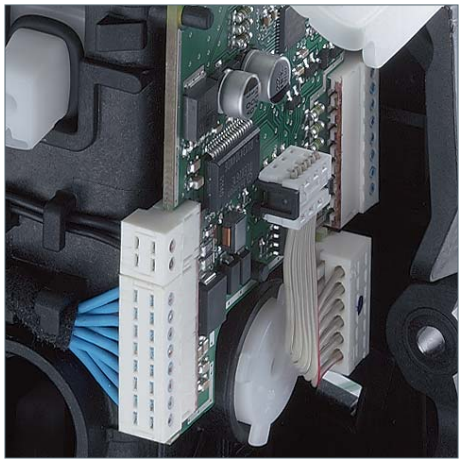
In doing so, we incorporate sophisticated production technologies into a fully automatic assembly line. Here, 27 individual components are processed in 46 process stages.

This example of a complex sub-assembly shows the production of an electronic module for engine cooler ventilator drives of passenger cars. In this unit, we manufacture different versions of this module for different car models even for several OEMs on our production line built in-house for our customer.

Fully Automatic Integrated Processes:

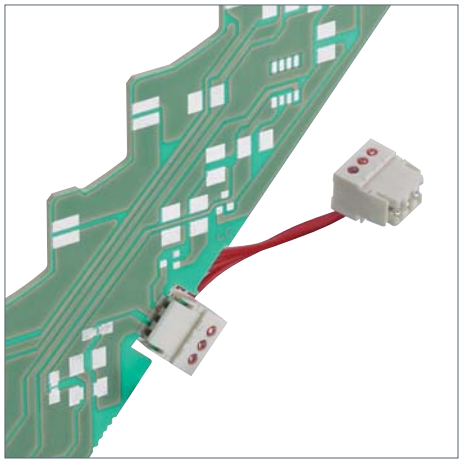
- Overmolding
- Assembling
- Inductive Soldering
- Reflow Soldering
- Iron Soldering
- Laser Welding
- Dispensing
- Coating
- Data Matrix Labelling
- Functionality and Leakage Testing
- Flashing of Software

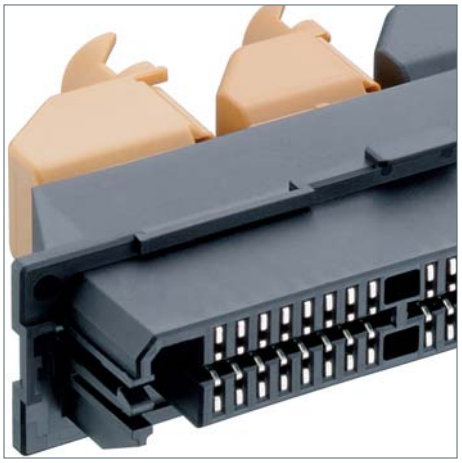




Ideas

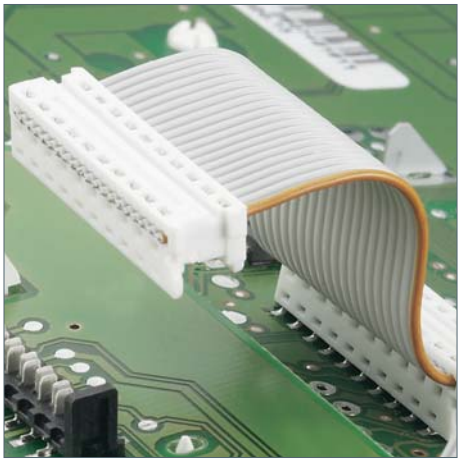
You know what to expect from us: a lot.





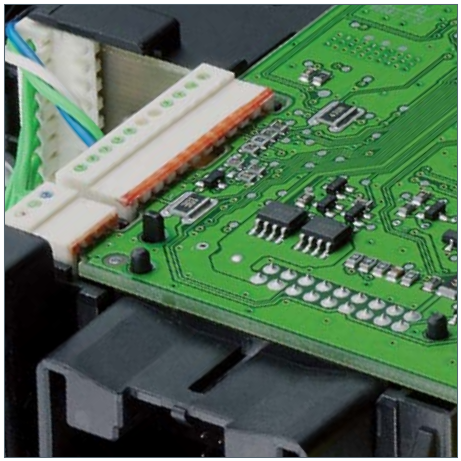
Agility

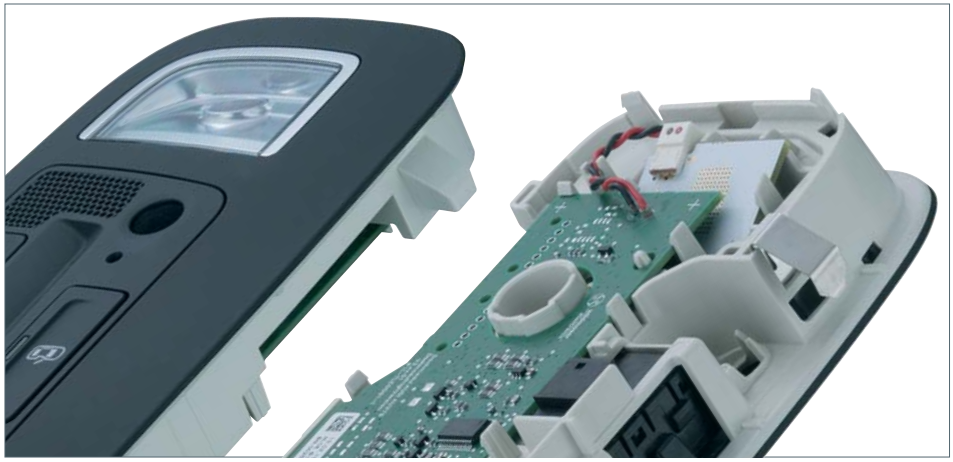
We have more speed, greater flexibility, more individuality.



Our Success

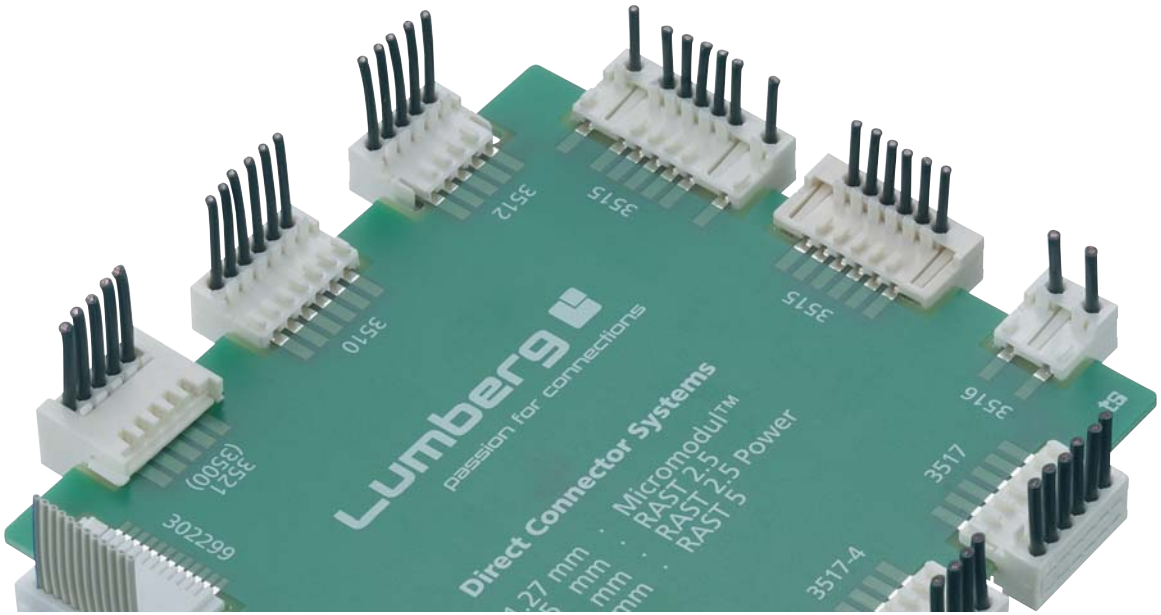
We are on board of 400 car models from 60 makers.





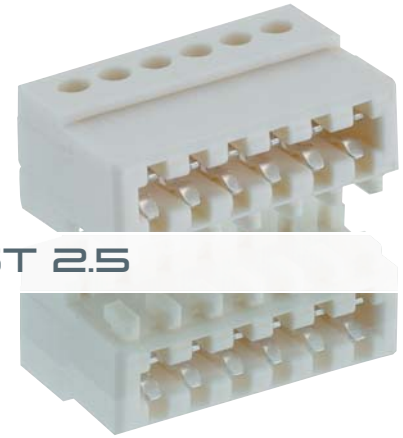
Lumberg

passion for connections



Automotive Connector Systems

PITCH 2.5/5 mm

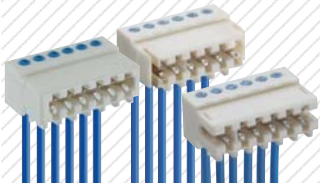


RAST 2.5

- Insulation Displacemet Technology (IDT)
- Keying to avoid mismating according to RAST 2.5 standards
- Locking options
- For signal and load currents up to 4 A
- According to automotive standards

3510–3518

RAST 2.5 connectors, direct mating, with/without locking, 2.5/5.0 mm
3517-4 with enhanced locking



3520–3523

RAST 2.5 connectors, direct or indirect mating, with/without locking, 2.5/5.0 mm

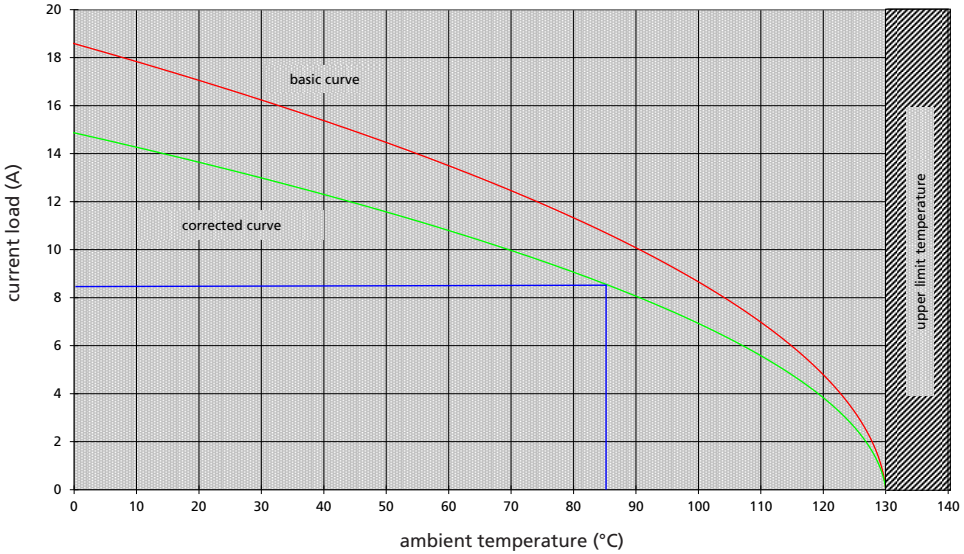
355095–355395

RAST 2.5 plus™ pin header, upright, in surface mount technology (SMT), with/without locking latch, with one or two positioning spigots and with double-sided keying, 2.5/5.0 mm

	3510–3518 · 3520–3523
TEMPERATURE RANGE	-40 °C/+130 °C
MATERIALS	
Insulating body 35..(-...) (S...V...)	PBT, V0 according to UL 94
Insulating body 35..(-...) M12(S...V...)	PA, V2 according to UL 94
Contact spring 35..(-...) (M...S...)	CuSn, tin-plated
Contact spring 35..(-...) (M...S...)V03	CuSn, tin-plated (Sn/Ag)
Contact spring 35..(-...) (M...S...)V102	CuSn, pre-nickel and gold-plated
MECHANICAL DATA	
Insertion force/contact	≤ 4.0 N
Withdrawal force/contact	≥ 0.5 N
Retaining force/lock	≥ 6.0 N (**3517-4** 13.4 N)
Mating with	printed circuit board 1.5 ± 0.14 mm (**352...** pin headers 354... and 355... and pin headers acc. to RAST 2.5 standard)
CONNECTABLE CONDUCTORS INSULATION DISPLACEMENT TERMINAL	
Section 35..(-...) (M...V...)	0.22–0.38 mm²
Section 35..(-...) (M...)S01(V...)	0.34 mm² (7 wires)
Section 35..(-...) (M...)S02(V...)	0.14–0.22 mm²
Section 35..(-...) (M...)S03(V...)	0.22–0.38 mm²
Insulation diameter	≤ 1.6 mm
ELECTRICAL DATA	
Contact resistance	≤ 5 mΩ
Rated current	4 A at T_{amb} 60 °C 2 A at T_{amb} 100 °C
Rated voltage	32/250 V AC
Material group	IIIa (IEC)/2 (UL) (CTI ≥ 250)
Creepage distance	0.6/3.1 mm
Clearance	0.6/3.1 mm
Insulation resistance	> 1 GΩ

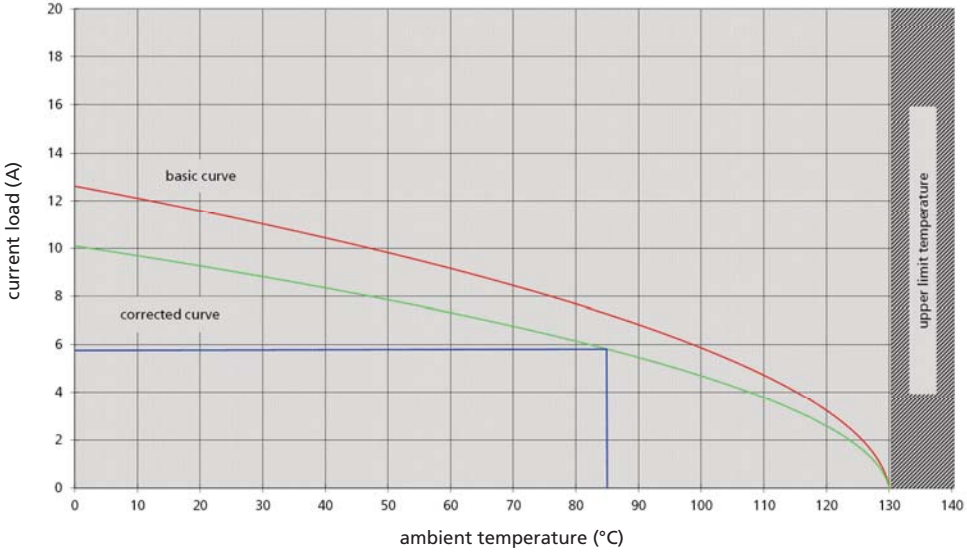
Derating Curve 3510 02 S03V03

all contacts loaded (measured at inner contacts), direct mating on printed circuit board FR4 double-sided 35 µm; conductor section 0.35 mm²



Derating Curve 3510 09 S03V03

all contacts loaded (measured at inner contacts), direct mating on printed circuit board FR4 double-sided 35 µm; conductor section 0.35 mm²



Automotive Standards Testing for RAST 2.5 Connector

In addition to passing the in-house standards of our automotive clients, LV 214 is frequently referred to as a general standard which, however, can be applied for RAST connectors to a certain degree only as it targets connector housings into which crimp contacts are individually placed. With the RAST 2.5 system, however, the insulation displacement contacts a single unit with the insulating body. Consequently, certain test groups (PG) that cater to the housing or the separate crimp contact, are uncalled-for due to the system's design, such as PG 6, 7, 8 and 20 A. Other test groups, on the other hand, rely on the customized PCB design, such as for example PG 9 and 11. Please refer to our guidelines for the PCB design. We are happy to perform testing according to your specifications. PG 22 A – chemical resistance – depends on your operational environment. For this, we will gladly perform testing using your preferred test medium.

The RAST 2.5 connector system achieved positive test ratings with a 5-pole connector (models 3510, 3512, 3515, 3517, 3521 in V102 versions, i.e. 0.8 µm selectively gold plated) in the relevant test groups based on the latest 2010 version of LV 214: on top of the mechanical test groups 1 to 5 that were passed, this also includes PG 10 to 13 as well as 15, 16 and 21 A and the particularly wide-ranging PG 19 (environmental simulation). Our in-house laboratory has lined up the test setup for PG 17 (dynamic stress) as well as 20 A.

Test Sequence	Test
PG 0	Incoming inspection
PG 1	Dimensions
PG 2	Material and plating analysis, contacts
PG 3	Material and plating analysis, housing
PG 4	Dimensional contact security
PG 5	Contact force diagram
PG 6	Reciprocation between housing and contacts
PG 7	Handling and functional security of housing
PG 8	Insertion and housing forces of contact elements
PG 9	Plug-in angle
PG 10	Wire extraction force
PG 11	Insertion and withdrawal forces, mating cycles
PG 12	Derating
PG 13	Derating influence of housing
PG 14	Thermal time constant
PG 15	Electrical stress test
PG 16	Fretting corrosion
PG 17	Dynamical stress
PG 18	Coastal climate stress
PG 19	Environmental simulation
PG 20 A	Climate stress to housing
PG 21 A	Long time temperature tests
PG 22 A	Chemical resistance

PITCH 1.27 mm

- Small PCB footprint
- Insulation Displacemet Technology (IDT)
- Up to 1.2 A
- According to automotive standards

302299

Micromodul™ connectors, direct mating, 1.27 mm

MICA · MICAL

Micromodul™ connectors, indirect mating, 1.27 mm

MICS...

Micromodul™ tab headers, THT and SMT, 1.27 mm

	302299	MICA · MICAL
TEMPERATURE RANGE	**-40 °C/+130 °C**	**-40 °C/+120 °C**
MATERIALS		
Insulating body	PA GF, V0 according to UL 94	PBT, V0 according to UL 94
Contact spring	CuSn, pre-nickel and tin-plated	CuSn, tin-plated
Contact spring gold-plated	**302299 V122**: CuSn, pre-nickel and gold-plated in contact area, tin-plated in insulation displacement area	**MICA SEL 0.8 AU**: CuSn, gold-plated in contact area, tin-plated in insulation displacement area
MECHANICAL DATA		
Insertion force/contact	< 1.3 N	< 0.8 N
Withdrawal force/contact	> 0.3 N	> 0.4 N
Mating with	printed circuit board 1.6 ± 0.14 mm	tab headers MICS...
CONNECTABLE CONDUCTORS INSULATION DISPLACEMENT TERMINAL		
Section	AWG 28 (0.090 mm²)	AWG 28 (0.090 mm²) AWG 26 (0.135 mm²) AWG 26 (0.140 mm²)
Approved cables on the Internet site www.lumberg.com		
ELECTRICAL DATA		
Contact resistance	≤ 5 mΩ	≤ 10 mΩ
Rated current	1.2 A bei T_{amb} 85 °C	1.2 A
Rated voltage	125 V AC	32 V AC (250 V AC)
Material group	I (IEC)/0 (UL) (CTI ≥ 600)	IIIa (IEC)/3 (UL) (CTI ≥ 175)
Creepage distance	0.79 mm	0.54 mm
Clearance	0.79 mm	0.54 mm
Insulation resistance	> 1 GΩ	> 1 GΩ

PITCH 7.5 mm

RAST 7.5 Power™

- Indirect mating
- Insulation Displacemet Technology (IDT), AWG 14/2.5 mm²
- Up to 25 A/500 V AC
- According to automotive standards

3690

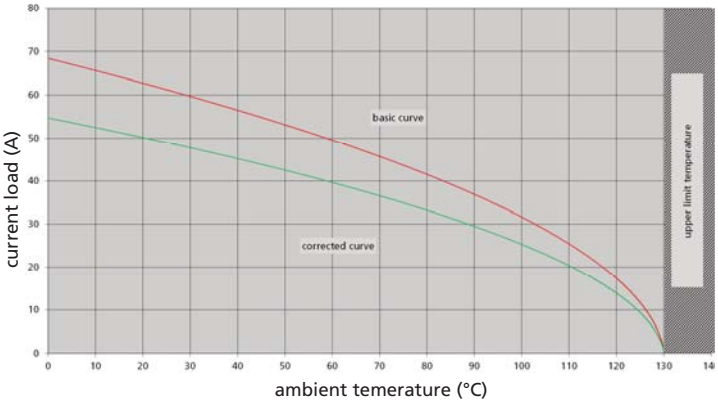
RAST 7.5 Power™ connector, indirect mating, 7.5 mm

3695

RAST 7.5 Power™ tab header, 7.5 mm

Derating Curve 3690 01

indirect mating on tab header 3695 01; conductor section AWG 14



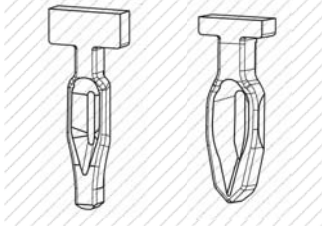
	3690
TEMPERATURE RANGE	**-40 °C/+130 °C**
MATERIALS	
Insulating body	PA, V2 according to UL 94
Contact spring	CuNiSi, silver-plated
MECHANICAL DATA	
Insertion force	≤ 95 N (2 pole version)
Withdrawal force	≥ 45 N (2 pole version)
Mating with	tab 6.3 x 0.8 mm according to DIN EN 61210/DIN 46244, tab header 3695
CONNECTABLE CONDUCTORS INSULATION DISPLACEMENT TERMINAL	
Section	AWG 14 (2.5 mm²)
Insulation diameter	≤ 3.6 mm
Approved cables on the Internet site www.lumberg.com	
Proposed keyings on the Internet site www.lumberg.com	
ELECTRICAL DATA	
Contact resistance	≤ 5 mΩ
Rated current	25 A at T_{amb} 85 °C
Rated voltage	500 V AC
Material group	IIIa (IEC)/2 (UL) (CTI ≥ 250)
Creepage distance	5.7 mm
Clearance	5.7 mm
Insulation resistance	> 10 GΩ

Press-fit Technology

- Solderless
- Proven geometries
- Free configuration optional
- Shock and vibration-resistant

7200 · 7201

Press-fit contacts, material thickness 0.6 mm and 0.8 mm



	7200 (0.6)	7201 (0.8)
SPECIFIC DATA PRESS-FIT (ZONE)		
Material	CuSn, alternativly CuCrAgFeTiSi	CuSn, alternativly CuCrAgFeTiSi
Surface	pre-nickel and tin-plated	pre-nickel and tin-plated
Material thickness	0.6 mm	0.8 mm
Press-in zone length	4.7 mm	4.7 mm
Construction contact side	geometric and service according to customer requirements	geometric and service according to customer requirements
SPECIFIC DATA PC-BOARD		
Material	FR4[1] min. T_g (DSC)=150 °C	FR4[1] min. T_g (DSC)=150 °C
Surface	chem. tin-plated	chem. tin-plated
Thickness	1.6 mm ± 10 %	1.6 mm ± 10 %
Type	multilayer[2]	multilayer[2]
Hole diameter		
without Cu plating	Ø 1.15 ± 0.025 mm	Ø 1.6 ± 0.025 mm
with Cu plating and finishing	Ø 1.05 ± 0.05 mm	Ø 1.49 ± 0.05 mm
Copper coating thickness hole	30–50 µm	30–50 µm
MECHANICAL DATA[3]		
Press-in force	75 ± 20 N	70 ± 20 N
Extraction force	80 ± 20 N	70 ± 20 N
FURTHER SPECIFICATIONS		
approved acc. to internal test specification (on request) subject to automotive requirements on the basis of IEC 60352-5		

[1] acc. to IPC-4101 C

[2] acc. to IPC-A600H Class 3, IPC-6011 Class 3, IPC-6012 C Class 3, IPC-TM-650 and Perfag 2F/3D

[3] at room temperature 23 ± 5 °C, hole Ø 1.05 mm (EPZ 0.6) and Ø 1.49 mm (EPZ 0.8), for use in combination with other FR-base materials and PC-board layouts the declared values values in the data sheet can be deviate.

- Modular semi-automatic and fully automatic harnessing machines, flexibly extendible
- Harnessing solutions for all Lumberg systems in IDT
- Stroke capacity up to 10.500 contact per hour
- For low, middle or high volume productions

HZ...35...

Manual tongs for termination and keying of RAST 2.5 connectors

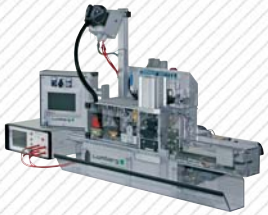
KHP35

Knuckle-joint press for termination of RAST 2.5 connectors

connectors: 351..., 351...-2, 352... – stroke capacity **HZ** ca 240/h, **KHP** ca 450/h

HA35...

Semi-automatic harnessing machines for termination of RAST 2.5 connectors



connectors: 351..., 351...-2, 352... – stroke capacity ca 1.200/h

VARICON 7000-RD

Fully automatic harnessing machines for termination of RAST connectors, for flexible harness configurations
- Highly efficient connector loading
- Highly efficient cable loading
- Flexible cable processing
- Quality assurance

connectors: RAST 2.5 (351..., 352..., 354...) – stroke capacity ca 10.500 contacts/h

HA35f...

Semi-automatic harnessing machine for termination of RAST 2.5 connectors, modular set-up, flexible extendible

	HA35f-KC-KT	HA35f-HV	HA35f-RK-CA-KC-KT	HA35f-RK-CA-KC-KT-HV	HA35f-RK-CA-HV
Connectors	351..., 351...-2, 352...				
State of delivery of connectors	in chain				
Processable conductor	discrete conductor, ribbon cable				
Stroke capacity	ca 1.200 discrete conductors per hour				
Cable color detection 7+1 (CA)			X	X	X
Verification of insertion pattern and line end position	X	X	X	X	X
Storage of insertion patterns	X	X	X	X	X
High-voltage test (HV)		X		X	X
Cutting and vacuum extraction device for connector chain interlinks (RK)			X	X	X
Keying cutting (KC)	X		X	X	
Keying test (KT)	X		X	X	
Automatic feeding of connectors	X	X	X	X	X

Your Success

Is based on their skills.

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