

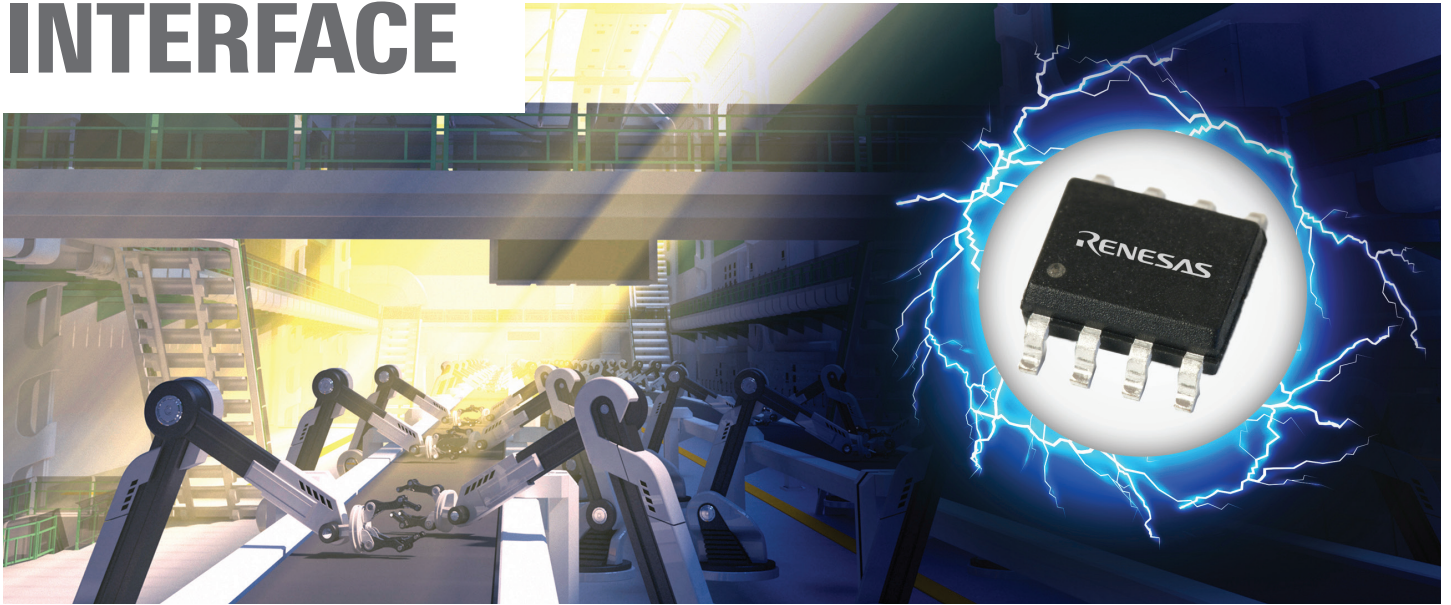
# TRANSCEIVERS

RS-485/422, RS-232, and Multi-Protocol



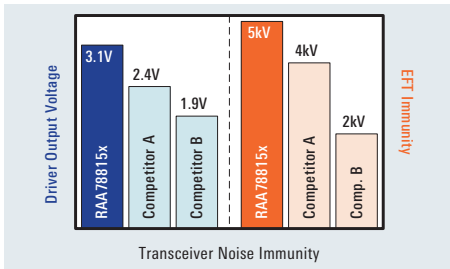
## Interface

# INTERFACE



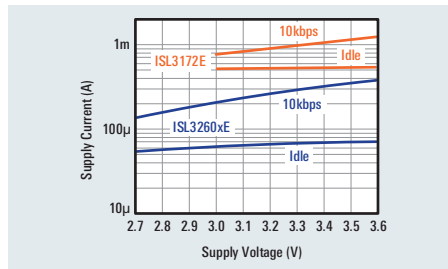
### High Noise Immunity

The RAA78815x transceivers have the industry's highest EFT Immunity and Output Drive.



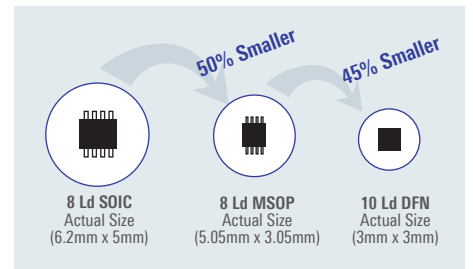
### Ultra Low Supply Current

ISL3260xE Idle current is 9 times lower than that of low power transceiver ISL3172E.



### Space-Saving Small Package

Reduced package size enables smaller, more compact products.

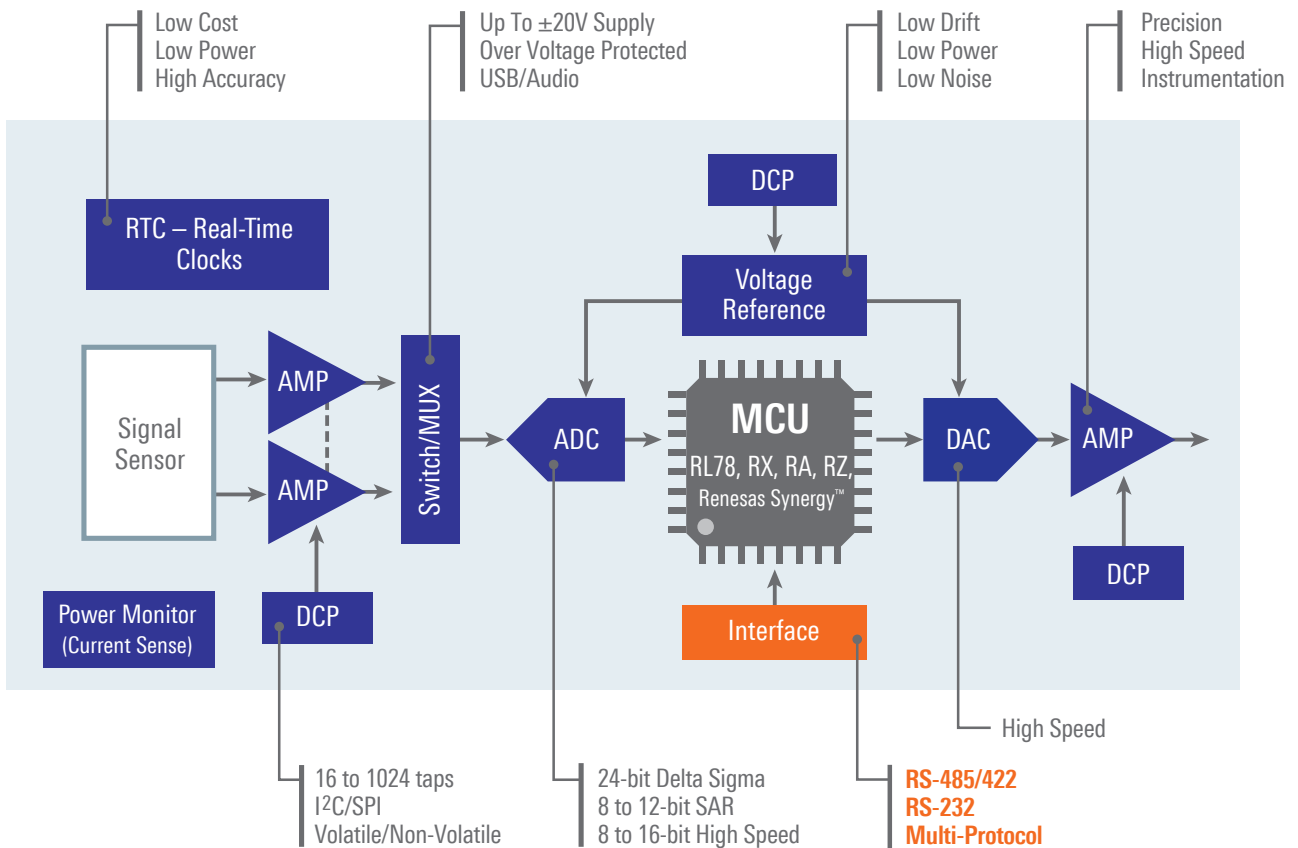


### Broad Portfolio to Fit Your Needs

RS-485/422	RS-232	Multi-Protocol (RS-485 & RS-232)
<ul style="list-style-type: none"> <li>High EFT immunity Transceivers (up to 5kV)</li> <li>High-speed Transceivers (20 to 100Mbps)</li> <li>Ultra-low Power Transceivers (<math>I_{cc} &lt; 100\mu A</math>)</li> <li>Fault Protected Transceivers (<math>V_{BR} = \pm 60V</math>)</li> </ul>	<ul style="list-style-type: none"> <li>Single, Dual, and Triple Transceivers (1 Tx/1 Rx, 2 Tx/2 Rx, 3 Tx/3 Rx)</li> <li>8-Channel Transceivers (5 Tx/3 Rx and 3 Tx/5 Rx)</li> </ul>	<ul style="list-style-type: none"> <li>Single and Dual Port devices</li> <li>Fixed and Programmable Ports</li> <li>Selectable RS-485 Speed (100kbps, 460kbps, 20Mbps)</li> </ul>

# Complete Signal Chain Solutions

Renesas' broad precision analog portfolio provides a wide range of next-gen precision instrumentation, medical, communication, and industrial process control applications where innovation, reliability, and dependability is central to the analog designs



## RS-485/RS-422

Half and full duplex transceivers in a variety of speed grades

## Multiprotocol RS-485/RS-422 and RS-232

Device that integrate RS-232 and RS-485 transceivers into a single package

## RS-232 Serial Interface

Transceivers featuring data rates up to 1Mbps, ESD protection, low power shut down modes

## RS-485/RS-422 Transceivers

RS-485 is a multi-point interface bus, meaning multiple drivers and receivers can be connected to one bus. RS-485 uses differential signaling to achieve high noise immunity. Its common-mode voltage range reaches from -7V up to +12V.

RS-422 is a multi-drop interface bus, meaning only one driver but multiple receivers can connect to one bus. RS-422 also uses differential signaling. Its common-mode voltage range however is smaller and ranges from -7V up to +7V.

Note that RS-485 transceiver can be used in RS-422 networks but not vice versa. RS-422 devices cannot be used in RS-485 systems.

Renesas has a 50-year history in interface transceivers and we are still a market leader today. We have a full portfolio of RS-485/RS-422 transceivers suited to most design needs.

### Transceivers with EFT Immunity per IEC61000-4-2

Part Number	VCC Range (V)	EFT (kV)	Data Rate (Mbps)	VOD (typ)(V)	Devices allowed on bus	Half / Full Duplex	IEC ESD (kV)	Quiescent ICC ( $\mu$ A)(RX = on)	ISHDN ( $\mu$ A)	Temp Range ( $^{\circ}$ C)
RAA78815(0,3,6)	4.5 - 5.5	$\pm$ 5	0.115, 1, 20	3.1	256	Full	$\pm$ 10	550	0.07	-40 to +85
RAA78815(2,5,8)	4.5 - 5.5	$\pm$ 5	0.115, 1, 20	3.1	256	Half	$\pm$ 16	550	0.07	-40 to +85
RAA78817(0,3,6)	3.0 - 3.6	$\pm$ 3	0.25, 0.5, 20	3.1	256	Full	$\pm$ 10	480	0.01	-40 to +85
RAA78817(2,5,8)	3.0 - 3.6	$\pm$ 3	0.25, 0.5, 20	3.1	256	Half	$\pm$ 16	480	0.01	-40 to +85
ISL315(0,3,6)E	4.5 - 5.5	$\pm$ 2	0.115, 1, 20	3.1	256	Full	$\pm$ 10	550	0.07	-40 to +85
ISL315(2,5,8)E	4.5 - 5.5	$\pm$ 2	0.115, 1, 20	3.1	256	Half	$\pm$ 16	550	0.07	-40 to +85
ISL317(0,3,6)E	3.0 - 3.6	$\pm$ 2	0.25, 0.5, 20	3.1	256	Full	$\pm$ 10	480	0.01	-40 to +85
ISL317(2,5,8)E	3.0 - 3.6	$\pm$ 2	0.25, 0.5, 20	3.1	256	Half	$\pm$ 16	480	0.01	-40 to +85

### High-Speed Transceivers (DR $\geq$ 40Mbps)

Part Number	VCC Range (V)	Data Rate (Mbps)	VOD (typ)(V)	Half / Full Duplex	Devices allowed on bus	Hot Plug	IEC ESD (kV)	ICC (mA)	ISHDN ( $\mu$ A)	Temp Range ( $^{\circ}$ C)
ISL3179E	3.0 - 3.6	40	2.0	Half	160	Yes	$\pm$ 16.5	2.6	0.05	-40 to +125
ISL3180E	3.0 - 3.6	40	2.0	Full	160	Yes	$\pm$ 5	2.6	0.05	-40 to +85
ISL3159E	4.5 - 5.5	40	2.8	Half	160	Yes	$\pm$ 15	2.6	0.05	-40 to +125
ISL3160E	4.5 - 5.5	40	2.8	Full	160	Yes	$\pm$ 5	2.6	1.4	-40 to +125
ISL3259E	4.5 - 5.5	100	2.8	Half	160	Yes	$\pm$ 15	2.6	0.05	-40 to +85

### Ultra-Low Power Transceivers

Part Number	# TX	# RX	VCC Range (V)	Data Rates (kbps)	Duplex	# Devices allowed on bus	Bus ESD (kV)	Quiescent ICC ( $\mu$ A)	ISHDN ( $\mu$ A)	Temp Range ( $^{\circ}$ C)
ISL32600E	1	1	2.7 - 3.6	256	Full	256	$\pm$ 15	70	0.01	-40 to +125
ISL32601E	1	1	2.7 - 3.6	256	Half	256	$\pm$ 15	70	0.01	-40 to +125
ISL32603E	1	1	1.8 - 3.6	460	Half	256	$\pm$ 15	150	0.01	-40 to +125
ISL32612E	0	1	1.8 - 3.3	256 / 500	-	256	$\pm$ 16.5	85	-	-40 to +125
ISL32614E	1	0	1.8 - 3.3	128 / 256	-	256	$\pm$ 16.5	100	0.01	-40 to +125

### Single RS-485/422 Drivers and Receivers

Part Number	# TX	# RX	VCC Range (V)	Data Rate (Mbps)	VOD (typ) (V)	V <sub>L</sub> Pin (V)	TX / RX Enables	IEC ESD (kV)	ICC ( $\mu$ A)	Temp Range ( $^{\circ}$ C)
ISL3295E	1	0	3.0 - 5.5	20	2.0 (V <sub>CC</sub> = 3.0V) 3.4 (V <sub>CC</sub> = 4.5V)	-	Active High	$\pm$ 16.5	120	-40 to +125
ISL3298E	1	0	3.0 - 5.5	20	2.0 (V <sub>CC</sub> = 3.0V) 3.4 (V <sub>CC</sub> = 4.5V)	1.6	Active High	$\pm$ 16.5	120	-40 to +125
ISL3280E	0	1	3.0 - 5.5	20	-	-	None	$\pm$ 16.5	400	-40 to +125
ISL3281E	0	1	3.0 - 5.5	20	-	-	Active High	$\pm$ 16.5	400	-40 to +125
ISL3282E	0	1	3.0 - 5.5	20	-	1.6	Active Low	$\pm$ 16.5	400	-40 to +125
ISL3283E	0	1	3.0 - 5.5	20	-	-	Active Low	$\pm$ 16.5	400	-40 to +125

## Quad RS-422 Drivers and RS-485/422 Receivers

Part Number	# TX	# RX	V <sub>CC</sub> Range (V)	Data Rate (Mbps)	V <sub>OD</sub> (typ) (V)	V <sub>L</sub> Pin (V)	TX / RX Enables	IEC ESD (kV)	I <sub>CC</sub> (μA)	Temp Range (°C)
RAA7884QT	4	0	3.0 – 5.5	50	2.6 (V <sub>CC</sub> = 3.0V) 4.0 (V <sub>CC</sub> = 4.5V)	–	Group	±16.5	0.8	-40 to +125
ISL32172E	4	0	3.0 – 5.5	32	2.6 (V <sub>CC</sub> = 3.0V) 4.0 (V <sub>CC</sub> = 4.5V)	–	Group	±16.5	0.6	-40 to +125
ISL32272E	4	0	3.0 – 5.5	10	2.6 (V <sub>CC</sub> = 3.0V) 4.0 (V <sub>CC</sub> = 4.5V)	–	Group	±16.5	0.6	-40 to +125
ISL32174E	4	0	3.0 – 5.5	32	2.6 (V <sub>CC</sub> = 3.0V) 4.0 (V <sub>CC</sub> = 4.5V)	–	Paired	±16.5	0.6	-40 to +125
ISL32179E	4	0	3.0 – 5.5	32	2.6 (V <sub>CC</sub> = 3.0V) 4.0 (V <sub>CC</sub> = 4.5V)	1.6	Individual & Group	±16.5	0.6	-40 to +125
ISL32173E	0	4	3.0 – 5.5	80	–	–	Group	±16.5	15	-40 to +125
ISL32177E	0	4	3.0 – 5.5	80	–	1.6	Individual & Group	±16.5	15	-40 to +125
ISL32273E	0	4	3.0 – 5.5	20	–	–	Group	±16.5	5.5	-40 to +125
ISL32275E	0	4	3.0 – 5.5	20	–	–	Paired	±16.5	5.5	-40 to +125
ISL32277E	0	4	3.0 – 5.5	20	–	1.6	Individual & Group	±16.5	5.5	-40 to +125
RAA7884QR	0	4	3.0 – 5.5	80	–	–	Group	±16.5	15	-40 to +125

## Overvoltage Protected Transceivers

Part Number	V <sub>CC</sub> Range (V)	OVP (V)	CMVR (V)	Half / Full Duplex	Data Rates (Mbps)	Devices allowed on bus	Hot Plug	IEC ESD (kV)	I <sub>CC</sub> / ISHDN (mA)	Temp Range (°C)
ISL3243xE	3.0 – 5.5	±40	±15	HD / FD	0.25 / 1.0	128	No	±15	2.1 / 0.01	-40 to +85
ISL3245xE	3.0 – 5.5	±60	±20	HD / FD	0.25 / 1 / 20	128	No	±15	2.1 / 0.01	-40 to +85
ISL3247xE	4.5 – 5.5	±60	±15	HD / FD	0.25 / 1 / 15	128	Yes	±16.5	2.3 / 0.01	-40 to +85
ISL3249xE	4.5 – 5.5	±60	±25	HD / FD	0.25 / 1 / 15	128	Yes	±16.5	2.3 / 0.01	-40 to +85

x = 0,2,3,5,6,8

## RS-232 Transceivers

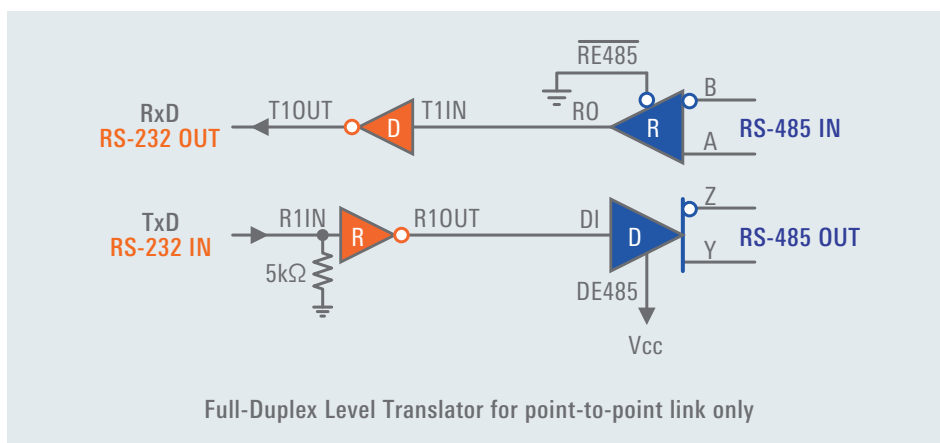
RS-232 is a point-to-point interface between two RS-232 transceivers. RS-232 using single-ended signaling but with positive and negative voltages, such as ±5V to ±13V.

## RS-232 Transceivers with Single, Dual, and Triple Channels

Part Number	Data Rate(Mbps)	V <sub>CC</sub> (V)	Shutdown* Man./Auto	High ESD (kV)	Temp Range (°C)	Package
SINGLE TRANSCEIVER ( 1 Tx / 1 Rx )						
ICL3221E	0.5	3 – 5	A (B)	15	-40 to +85	SSOP16, TSSOP16
ICL3226E	0.5	3 – 5	A (E)	15	-40 to +85	SSOP16
DUAL TRANSCEIVERS ( 2 Tx / 2 Rx )						
ICL3222E	0.5	3 – 5	M	15	-40 to +85	SOIC18, SSOP20, TSSOP20
ICL3223E	0.5	3 – 5	A (B)	15	-40 to +85	SSOP20, TSSOP20
ICL3224E	0.5	3 – 5	A (E)	15	-40 to +85	SSOP20
ICL3225E	1	3 – 5	A (E)	15	-40 to +85	SSOP20
ICL3232E	0.5	3 – 5	M	15	-40 to +85	SOIC16, SSOP16, TSSOP16, TSSOP20
ISL4223E	0.5	3 – 5	A (B)	15	-40 to +85	QFN20
TRIPLE TRANSCEIVERS ( 3 Tx / 3 Rx )						
ISL4270E	0.5	3.0 – 5.5	A (E)	15	-40 to +85	QFN32
ISL83387E	0.5	3.0 – 5.5	A (E)	15	-40 to +85	TSSOP24

## Multi-Protocol Transceivers

Multi-protocol transceivers support both RS-485 and RS-232 interface specifications. They can be used as compact interface solutions, or as interface bridges, converting signal from one standard to the other. Multi-protocol transceivers are in single or dual port variants, where each port can be configured either as a full duplex RS-485 transceiver, or as a two-channel RS-232 transceiver.



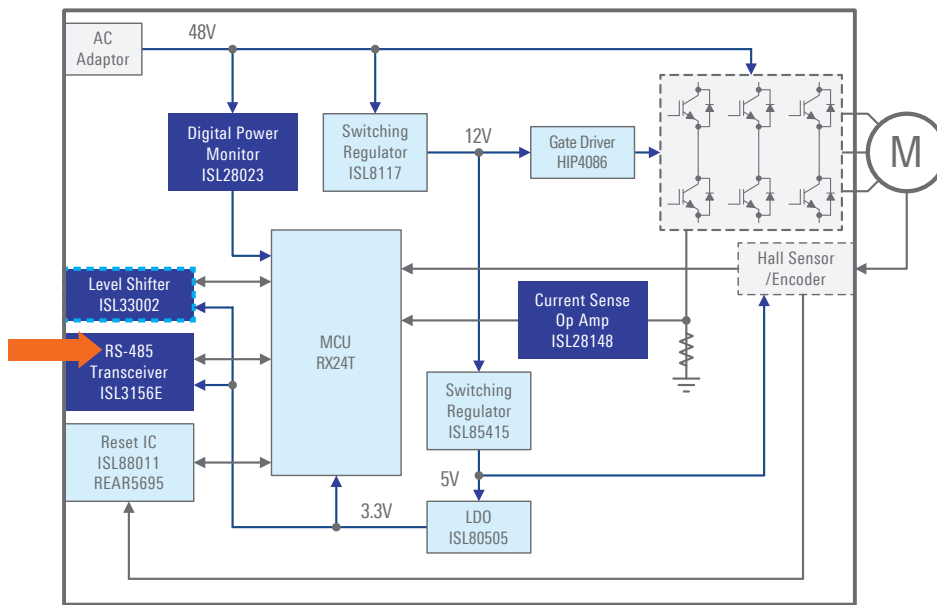
## Multi-Protocol Transceivers with Single and Dual Ports

Part Number	# Ports	Config.	Data Rate (Mbps)		Vcc (V)	VL-Pin (1.8V)	RXEN Polarity	Loopback	ESD (kV)	Temp Range (°C)	Package
			RS-485	RS-232							
ISL33337E	2	Fixed	20, 0.115	0.4	3	No	Low	No	15	-40 to +85	QFN40
ISL33354E	2	Fixed	20, 0.115	0.4	5	No	Low	No	15	-40 to +85	SSOP28
ISL81387	1	Prog.	20, 0.46, 0.115	0.65	5	No	High	Yes	15	-40 to +85	SOIC20, SSOP20
ISL41387	1	Prog.	20, 0.46, 0.115	0.5	5	Yes	High and Low	Yes	15	-40 to +85	QFN40
ISL3330	1	Prog.	20, 0.46	0.4	3	No	High	Yes	15	-40 to +85	SSOP20
ISL3331	1	Prog.	20, 0.46, 0.115	0.4	3	Yes	High and Low	Yes	15	-40 to +85	QFN40
ISL81334	2	Prog.	20, 0.46, 0.115	0.65	5	No	None	Yes	15	-40 to +85	SOIC28, SSOP28
ISL41334	2	Prog.	20, 0.46, 0.115	0.5	5	Yes	Low	Yes	15	-40 to +85	QFN40
ISL3332	2	Prog.	20	0.4	3	No	None	Yes	15	-40 to +85	SSOP28
ISL3333	2	Prog.	20, 0.46, 0.115	0.4	3	Yes	Low	Yes	15	-40 to +85	QFN40

# WINNING COMBOS

## Renesas Industrial Signal Chain Solutions

Renesas offers dozens of Winning Combinations - expert designs showcasing Renesas' product portfolios of Embedded Processing, Analog, Power, and Connectivity. With these engineering-vetted designs, customers can take advantage of an elevated platform for their design ideas, accelerating their product development cycle and lowering their overall risk to bring their designs to market.



Featured Solution: 48V Position Control Solution

Solutions for BLDC motor applications have been increasing rapidly because of the demand for products that are smaller in size and provide high efficiency. The core of a BLDC motor design is a robust and reliable motor control circuit and a versatile MCU for a safe control algorithm. Key building blocks of a motor control circuit include a MOSFET driver, versatile MCU, voltage regulators, a cell balancer, and the battery charger. Analog Components highlighted in Blue.

### Other Winning Combos featuring Analog products

WC Code	WC Title	Market	Application	Products	Product Type
CN082	Smart Industrial Gas Alarm	Industrial	Safety, Surveillance & security	ISL3158E	RS-485/RS-422
AS044	Green 3-Phase Smart Energy Meter	Power & Energy	Monitoring / Metering	ISL8485	RS-485/RS-422
EU115	Embedded Programmable Logic Controller (PLC) for Industrial	Industrial	Factory Automation	ISL3176E	RS-485/RS-422
AS044	Green 3-Phase Smart Energy Meter	Power and Energy	Monitoring / Metering	ISL8485	RS-485/RS-422
CN204	1-Phase Power Meter	Power and Energy	Monitoring / Metering	ISL3159E	RS-485/RS-422

Key Components	Key Features
ISL3156E	RS-485/RS-422 transceiver features high output drive and high ESD protection
ISL28023	High-side and Low-side digital current sense and voltage monitor with a serial interface
ISL8117	Synchronous Step-Down PWM Controller
HIP4086	3-Phase MOSFET Driver
ISL33002	I <sup>2</sup> C Bus Buffer with Rise Time Accelerators and Hot Swap Capability
ISL88011	5 Ld Voltage Supervisor with Adjustable Power-On Reset, Dual Voltage Monitoring or Watchdog Timer Capability
RX24T	32-bit Microcontroller with On-chip FPU Enable to Drive Two Motors Simultaneously
ISL80505	High Performance Low Dropout Regulator
ISL85415	Synchronous Buck Regulator
ISL28148	Single Precision Rail-to-Rail Input-Output Op Amps with Very Low Input Bias Current

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