RS-485 Crash Course Part 2: Key Transceiver Parameters

A circuit designer selects an RS-485 transceiver based on several device parameters. These parameters must satisfy the requirements of the application the transceiver is used in. The most frequently considered parameters are listed below. Part 2 of this mini-tutorial explains their definitions and purposes.

Contents

1. Data Rate (DR) . . . 2
2. Unit Load (UL) . . . 3
3. Typical Driver Output Voltage (V_{OD}) . . . 4
4. Supply Current (I_{CC}) . . . 4
5. Supply Voltage (V_{CC}) . . . 4
6. Overvoltage Protection (OVP) . . . 5
7. Cable Invert Function . . . 5
8. ESD Rating (HBM, IEC61000-4-2) . . . 6
9. EFT Rating (IEC61000-4-4) . . . 7
10. Conclusion . . . 8
11. Revision History . . . 8
A. Appendix . . . 9
A.1 Low-Speed Transceivers (DR < 500kbps) . . . 9
A.2 Medium-Speed Transceivers (0.5Mbps ≤ DR < 10Mbps) . . . 10
A.3 High-Speed Transceivers (DR ≥ 10Mbps) . . . 10
A.4 Transceivers with 1/8 UL Rating (or allow 256 Devices on the Bus) . . . 11
A.5 Transceivers with V_{OD} > 2V . . . 13
A.6 Low-Power Transceivers (I_{CC} ≥ 550µA) . . . 14
A.7 Transceivers with V_{CC} = 5V . . . 16
A.8 Transceivers with V_{CC} ≤ 3.3V . . . 17
A.9 Transceivers with V_{CC} = 3V to 5V . . . 18
A.10 Overvoltage-Protected Transceivers (OVP = ±40V to ±60V) . . . 19
A.11 Overvoltage-Protected Transceivers with Cable Invert Function . . . 19
A.12 Transceivers with High ESD (ESD ≥ 10kV) . . . 20
A.13 Transceivers with High EFT (EFT > 2.5kV) . . . 21

© 2023 Renesas Electronics

1. Data Rate (DR)

The transmission cable of an RS-485 network can be seen as a capacitor whose capacitance increases proportionally with cable length. Reliable data transmission requires that the driver output has sufficient time to charge and discharge the cable capacitance to present the driver output states correctly at a remote receiver location.

Therefore, long cable runs with a large capacitance require longer charge and discharge times or high and low driver output states, translating into lower data rates (Figure 1). In contrast, high data rates with much shorter bit intervals can only fully charge and discharge much smaller capacitances, which require significantly shorter cable lengths.

Figure 1 depicts a commonly applied Cable Length versus Data Rate characteristic, which is partitioned into low, medium, and high data rate segments.

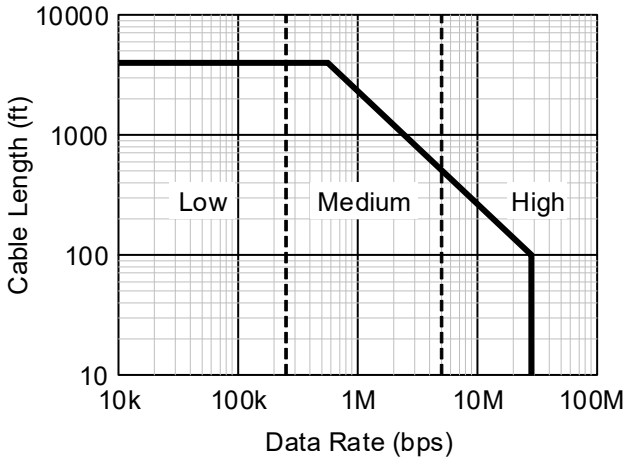

Figure 1. Cable Length vs Data Rate Characteristic for 10% Jitter

At low data rates, the maximum cable length is limited by the voltage divider action between a termination resistor and the cable's DC resistance such that at 4000ft (1200m), the source signal is attenuated by 50% or 6dB.

At medium data rates, the driver output states change quicker, necessitating a lower cable capacitance, which is only achieved by reducing the cable length.

At high data rates, the maximum cable length becomes so short that the cable characteristics do not come into play, and the driver data rate solely depends on the transition (rise/fall) times of the driver.

Although the transition between low to medium and medium to high data rates remains somewhat fuzzy, manufacturers of RS-485 transceivers often separate their transceiver portfolios into low, medium, and high-speed devices using the following criteria:

- Low-speed transceivers have maximum data rates of up to 250kbps, sometimes even 500kbps.
- Medium-speed transceivers have data rates from 500kbps to 5Mbps.
- High-speed transceivers provide maximum data rates of 10Mbps and beyond.

See Low-Speed Transceivers (DR < 500kbps), Medium-Speed Transceivers (0.5Mbps ≤ DR < 10Mbps), and High-Speed Transceivers (DR ≥ 10Mbps) for Renesas' portfolio of low-, medium-, and high-speed transceivers.

2. Unit Load (UL)

During data transmission, a single driver must drive multiple receiver inputs. How many receivers a driver can drive depends on the receiver input resistance. Here, the RS-485 standard specifies that a single driver must be able to drive up to 32-unit loads.

A single unit load (1UL) is a receiver input current of 1mA at a common-mode input voltage of 12V to either bus input terminal (A or B), which is synonymous with an input resistance of 12kΩ (Figure 2).

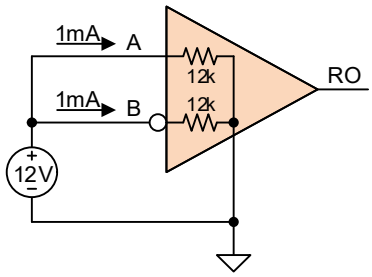

Figure 2. Definition of a Unit Load

A legacy transceiver has an input resistance of 12kΩ and, therefore, a 1UL rating. This limits the maximum number of 1UL bus transceivers connected to a single driver to 32.

A modern RS-485 transceiver typically has an eight-times higher input resistance of 96kΩ, which reduces its input currents to 1/8 of 1mA. Therefore, its UL rating is ⅛ UL.

Use Equation 1 to calculate the maximum number of transceivers (XCVRs) that can be driven by a single driver, where UL_{XCVR} is the UL-rating of a transceiver, and n_{XCVR} is the maximum allowed number of bus transceivers per driver.

(EQ. 1) $$n_{XCVR} = \frac{32ULs}{UL_{XCVR}}$$

Consequently, a lower, fractional UL rating allows more bus transceivers to be connected to a single driver until the limit of 32ULs is reached (Figure 3).

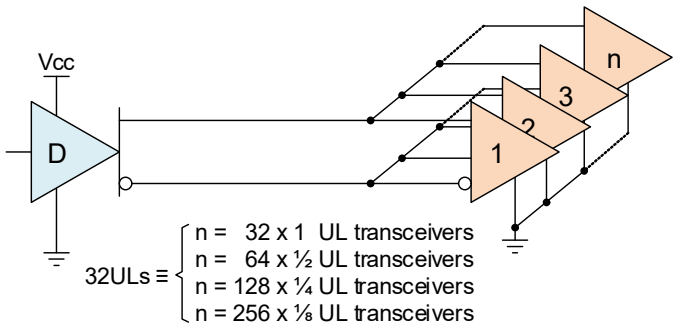

Figure 3. Establishing the maximum Number of Bus Transceivers

While the past four decades brought out transceiver designs with UL ratings of 1/2, 1/4, and 1/5 UL, transceivers with a 1/8 UL rating are the preferred choice in today's industrial network designs.

See Transceivers with 1/8 UL Rating (or allow 256 Devices on the Bus) for transceivers with a 1/8 UL rating.

3. Typical Driver Output Voltage (V_{OD})

As RS-485 only specifies the minimum differential driver output voltage with $V_{OD\ (min)}$ = ±1.5V across a differential load resistance of R_L = 54Ω, network designers often look for typical values of $V_{OD\ (typ)}$ > ±2.0V.

Higher V_{OD} values are preferred to achieve:

- Higher noise margin in electrical noisy environments
- Longer cable runs
- Higher drive capability for more bus transceivers

Figure 4 shows a V-I diagram that compares Renesas' ISL3152E flagship transceivers with standard transceivers from two competitors. *Note:* The ISL315xE transceiver family has twice the output drive specified in the RS-485 standard.

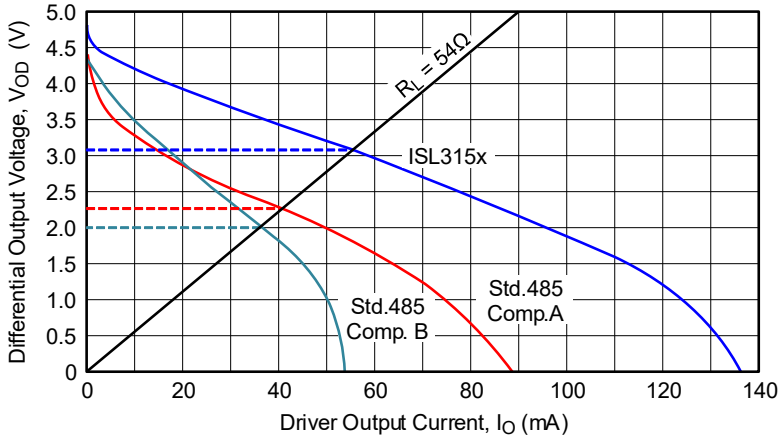

Figure 4. V_{OD} Comparison between ISL315xE and Standard Transceivers

See Transceivers with V_{OD} > 2V for transceivers with typical V_{OD} values > 2V.

4. Supply Current (I_{CC})

Because a bus node is usually a part of an entire data acquisition system, the transceiver's current consumption and corresponding power dissipation become important during bus node and network design. As a transceiver spends most of its operating time listening to bus traffic, only the receiver section remains active, while the driver section is disabled. Therefore, when selecting transceiver components, many engineers look for typical I_{CC} values in the range of 450 to 550µA under the test condition: DE = $\overline{RE}$ = 0V (driver disabled and receiver enabled).

See Low-Power Transceivers (I_{CC} ≥ 550µA) for transceivers with typical I_{CC} values < 550µA.

5. Supply Voltage (V_{CC})

Typical ranges of transceiver supply voltages are either 3.3V ±10% or 5V ±10%. Modern designs even allow for a supply range from 3.0 to 5.5V. Network designers typically decide between a power-saving 3V transceiver or a 5V transceiver with high output drive and high noise immunity.

See Transceivers with V_{CC} = 5V, Transceivers with V_{CC} ≤ 3.3V, and Transceivers with V_{CC} = 3V to 5V for transceivers with 5V, 3.3V, and 3-to-5V supply voltage ranges.

6. Overvoltage Protection (OVP)

Industrial network installations often have their 24V power lines routed in the same conduit as the RS-485 data lines. This routing carries the risks of installation cross-wiring faults, ground voltage faults, or lightning-induced surge voltages, all of which can cause overvoltage conditions that exceed the absolute maximum ratings of typical transceivers (Figure 5).

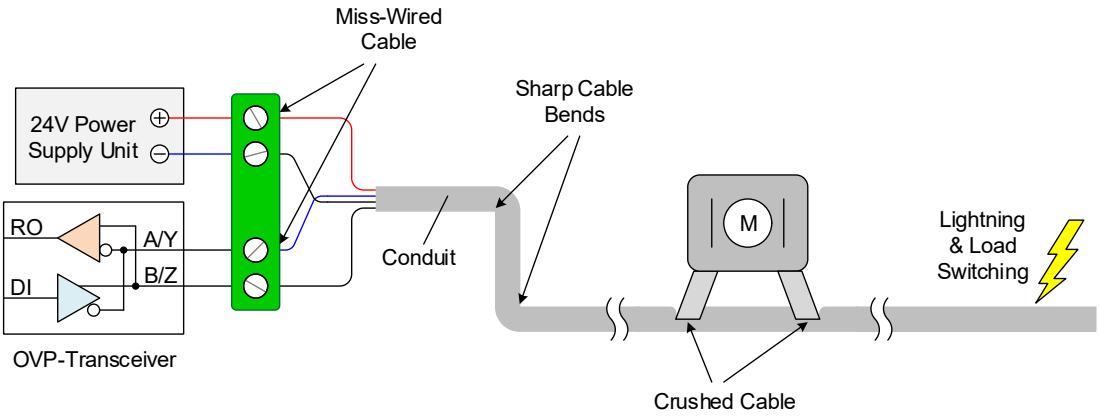

Figure 5. Multiple Causes for Overvoltage Faults Requiring an Overvoltage Protected (OVP) Transceiver

To ensure reliable data transmission, Renesas provides a series of overvoltage-protected (OVP) transceivers that can withstand AC and DC voltages of up to ±60V, whether a device is transmitting, receiving, in standby, or powered off.

At the same time, these transceivers provide extended common-mode voltage ranges (V_{CM}) of up to ±15V, ±20V, and ±25V, which is far beyond the -7V to +12V range specified in the RS-485 standard. The extended V_{CM} range enables transceivers to work reliably in long-distance networks, where the ground potential difference (GPD) between a driver and a remote receiver can reach up to ±20V and more.

Because GPDs either lower or raise the driver ground, they directly translate into common-mode voltages on the bus (Figure 6).

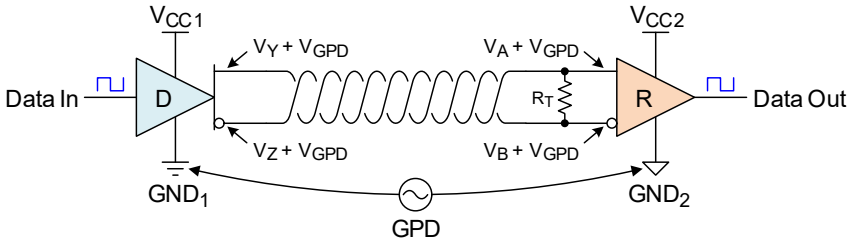

Figure 6. Ground Potential Difference Increases the Common-mode Voltage on the Bus

For detailed information on OVP transceivers, read the white paper *Overvoltage Protection for RS-485 Bus Nodes* and *AN1979: Surge Protection Simplified with Renesas' Overvoltage Protected (OVP) Transceivers*.

See Appendix Overvoltage-Protected Transceivers (OVP = ±40V to ±60V) for overvoltage-protected transceivers with extended common-mode voltage ranges.

7. Cable Invert Function

One of the most occurring faults during network installation is cross-wiring faults, where the two conductors of the transmission cable are mixed-up. To avoid the time-consuming process of detecting and correcting the fault

manually, Renesas offers transceivers that swap the polarity of the bus pins (A/Y and B/Z) based on the logic state of a control input, INV (Figure 7).

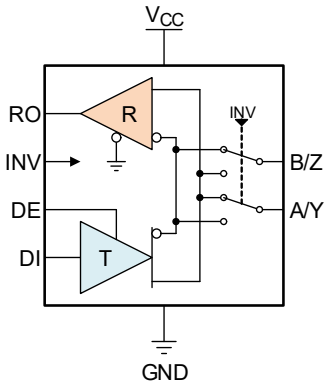

Figure 7. OVP Transceiver with Cable Invert Function

The INV pin replaces the $\overline{RE}$ pin of standard transceivers, which requires the receiver to be permanently active (the internal $\overline{RE}$ function is fixed to ground). Driving the INV high swaps the polarity of the bus pins. If unconnected (floating) or connected low, normal RS-485 polarity conventions apply.

See Overvoltage-Protected Transceivers with Cable Invert Function for overvoltage-protected transceivers with cable invert function.

8. ESD Rating (HBM, IEC61000-4-2)

Electrostatic Discharge (ESD) is an event caused by humans discharging electrostatic energy into electronic equipment. Transceivers often include internal protection circuits that divert ESD transient currents to either power supply rails, V_{CC}, or GND (Figure 8) to prevent device damage.

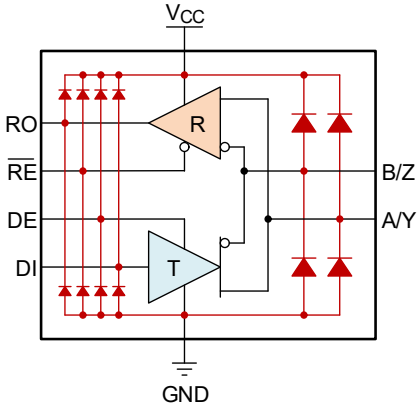

Figure 8. Equivalent Circuit for ESD Input and Output Protection

To determine a transceiver's ESD rating, ESD test generators, aka ESD guns, are used to apply ESD transients onto an individual device terminal. The test voltage at which a device is damaged becomes the ESD rating.

Here, the ESD rating of the bus terminals is of higher importance than that of the logic I/O terminals.

There are two ESD standards for ESD tests, JEDEC's Human Body Model (HBM) and IEC's 61000-4-2 ESD model. According to the IEC model, ESD transients create about five times higher current peaks and are shorter in

rise time and duration than HBM transients of the same test voltage (Figure 9), making the ESD test according to IEC the harsher test of the two. Therefore, designers often prefer an ESD rating based on IEC61000-4-2.

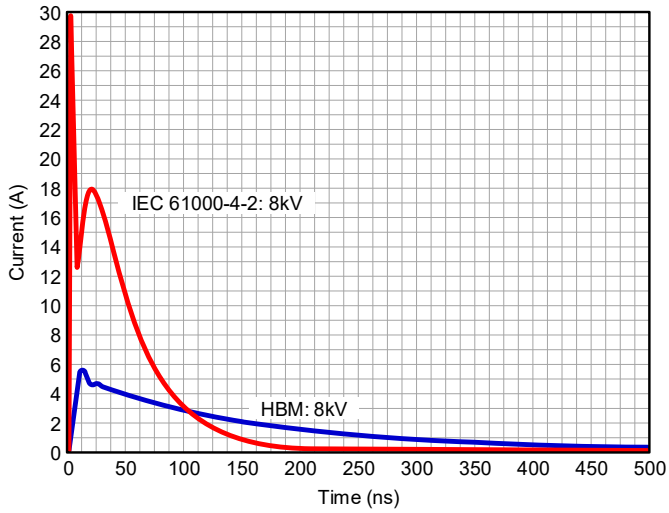

Figure 9. Comparison of ESD Currents between HBM and IEC61000-4-2

See Transceivers with High ESD (ESD ≥ 10kV) for transceivers with high ESD ratings.

9. EFT Rating (IEC61000-4-4)

Industrial networks using RS-485 transceivers can be subject to daily electrical fast transient (EFT) bombardment. These transients originate from switching transients due to the interruption (switching) of inductive loads, relay contact bounce, etc. These transients propagate along the electrical installation into electronic equipment, where they can corrupt the data between transmitting bus nodes and even damage transceivers, resulting in network downtime (Figure 10).

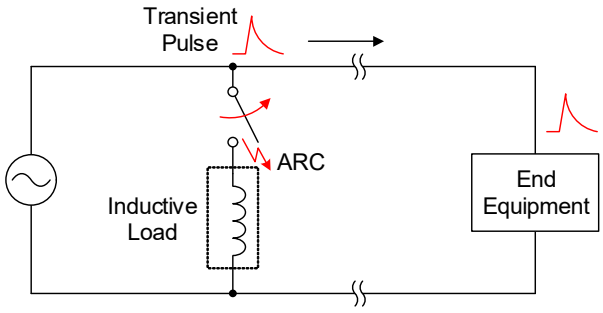

Figure 10. Generation and Coupling of EFT into End Equipment

Unlike ESD tests, where a test pulse is applied to a single bus terminal, EFT test pulses are applied as common-mode transients, and both bus terminals are tested simultaneously. Therefore, the transceiver's internal ESD circuits must react and recover fast from EFT events and simultaneously maintain network operation.

See Appendix Transceivers with High EFT (EFT > 2.5kV) for transceivers with high EFT immunity ratings.

10. Conclusion

Part 2 explained the key device parameters circuit designers consider when selecting RS-485 transceivers for their network designs. While a new parametric search engine is in the planning stage, an interim solution in the form of lists of op-amp categories is included in the Appendix.

11. Revision History

Revision	Date	Description
1.00	Jun 26, 2023	Initial release.

A. Appendix

A.1 Low-Speed Transceivers (DR < 500kbps)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL83080E	4.5	5.5	0.115	Full	256	2.4	530	15	-	-40	85	14	SOICN
ISL83082E	4.5	5.5	0.115	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL3170E	3	3.6	0.25	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3171E	3	3.6	0.25	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3172E	3	3.6	0.25	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL4489E	4.5	5.5	0.25	Full	256	2.3	140	15	-	-40	85	14	SOICN
ISL81483	4.5	5.5	0.25	Half	256	2.3	120	7	-	-40	85	8	PDIP, SOICN
ISL81487L	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	PDIP, SOICN
ISL83070E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83071E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83072E	3	3.6	0.25	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83483	3	3.6	0.25	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL83488	3	3.6	0.25	Full	32	2.3	650	-	-	-40	85	8	SOICN
ISL8483E	4.5	5.5	0.25	Half	32	2.3	160	15	-	-40	85	8	SOICN
ISL8487E	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	SOICN
ISL8488E	4.5	5.5	0.25	Full	32	2.3	120	15	-	-40	85	8	SOICN
ISL8489E	4.5	5.5	0.25	Full	32	2.3	140	15	-	-40	85	14	SOICN
ISL32600E	2.7	3.6	0.256	Full	256	1.7	46	12	-	-40	125	10	MSOP
ISL32601E	2.7	3.6	0.256	Half	256	1.7	46	15	-	-40	125	8	MSOP, SOICN

A.2 Medium-Speed Transceivers (0.5Mbps ≤ DR < 10Mbps)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL32603E	1.8	3.6	0.46	Half	256	1.7	125	15	-	-40	125	8	MSOP
ISL3173E	3	3.6	0.5	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3174E	3	3.6	0.5	Full	256	2	510	12	3	-40	85	8	MSOP
ISL3175E	3	3.6	0.5	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL83075E	3	3.6	0.5	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83083E	4.5	5.5	0.5	Full	256	2.4	530	15	-	-40	85	10	MSOP
ISL83085E	4.5	5.5	0.5	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN
ISL81487	4.5	5.5	5	Half	256	2.3	350	7	-	-40	85	8	SOICN
ISL81487E	4.5	5.5	5	Half	256	2.3	350	15	-	-40	85	8	PDIP, SOICN
ISL8485	4.5	5.5	5	Half	32	2.3	500	7	-	-40	85	8	SOICN
ISL8490	4.5	5.5	5	Full	32	2.3	500	7	-	-40	85	8	SOICN

A.3 High-Speed Transceivers (DR ≥ 10Mbps)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL83086E	4.5	5.5	10	Full	256	2.4	530	15	-	-40	85	14, 10	MSOP, SOICN
ISL83088E	4.5	5.5	10	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83485	3	3.6	10	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL83490	3	3.6	10	Full	32	2.3	650	-	-	-40	85	8	SOICN
ISL83491	3	3.6	10	Full	32	2.3	650	-	-	-40	85	14	SOICN
ISL8485E	4.5	5.5	10	Half	32	2.3	500	15	-	-40	125	8	SOICN
ISL8490E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	8	SOICN
ISL8491E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	14	SOICN
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3176E	3	3.6	20	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3177E	3	3.6	20	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3178E	3	3.6	20	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL4485E	4.5	5.5	20	Half	32	2.3	500	15	-	-40	85	8	SOICN
ISL83076E	3	3.6	20	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83077E	3	3.6	20	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83078E	3	3.6	20	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL43485	3	3.6	30	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL3159E	4.5	5.5	40	Half	160	2.8	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3160E	4.5	5.5	40	Full	160	2.8	2600	10	-	-40	125	14	SOICN
ISL3179E	3	3.6	40	Half	160	2.1	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3180E	3	3.6	40	Full	160	2.1	2600	12	-	-40	85	14	SOICN
ISL3259E	4.5	5.5	100	Half	160	2.8	2600	16.5	-	-40	85	8, 10	DFN, MSOP, SOICN

A.4 Transceivers with 1/8 UL Rating (or allow 256 Devices on the Bus)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3170E	3	3.6	0.25	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3171E	3	3.6	0.25	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3172E	3	3.6	0.25	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3173E	3	3.6	0.5	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3174E	3	3.6	0.5	Full	256	2	510	12	3	-40	85	8	MSOP

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3175E	3	3.6	0.5	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3176E	3	3.6	20	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3177E	3	3.6	20	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3178E	3	3.6	20	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL32600E	2.7	3.6	0.256	Full	256	1.7	46	12	-	-40	125	10	MSOP
ISL32601E	2.7	3.6	0.256	Half	256	1.7	46	15	-	-40	125	8	MSOP, SOICN
ISL32603E	1.8	3.6	0.46	Half	256	1.7	125	15	-	-40	125	8	MSOP
ISL4489E	4.5	5.5	0.25	Full	256	2.3	140	15	-	-40	85	14	SOICN
ISL81483	4.5	5.5	0.25	Half	256	2.3	120	7	-	-40	85	8	PDIP, SOICN
ISL81487	4.5	5.5	5	Half	256	2.3	350	7	-	-40	85	8	SOICN
ISL81487E	4.5	5.5	5	Half	256	2.3	350	15	-	-40	85	8	PDIP, SOICN
ISL81487L	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	PDIP, SOICN
ISL83070E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83071E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83072E	3	3.6	0.25	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83075E	3	3.6	0.5	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83076E	3	3.6	20	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83077E	3	3.6	20	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83078E	3	3.6	20	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83080E	4.5	5.5	0.115	Full	256	2.4	530	15	-	-40	85	14	SOICN
ISL83082E	4.5	5.5	0.115	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83083E	4.5	5.5	0.5	Full	256	2.4	530	15	-	-40	85	10	MSOP
ISL83085E	4.5	5.5	0.5	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83086E	4.5	5.5	10	Full	256	2.4	530	15	-	-40	85	14, 10	MSOP, SOICN
ISL83088E	4.5	5.5	10	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL8487E	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	SOICN

A.5 Transceivers with V_{OD} > 2V

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3159E	4.5	5.5	40	Half	160	2.8	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3160E	4.5	5.5	40	Full	160	2.8	2600	10	-	-40	125	14	SOICN
ISL3259E	4.5	5.5	100	Half	160	2.8	2600	16.5	-	-40	85	8, 10	DFN, MSOP, SOICN
ISL83080E	4.5	5.5	0.115	Full	256	2.4	530	15	-	-40	85	14	SOICN
ISL83082E	4.5	5.5	0.115	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83083E	4.5	5.5	0.5	Full	256	2.4	530	15	-	-40	85	10	MSOP
ISL83085E	4.5	5.5	0.5	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83086E	4.5	5.5	10	Full	256	2.4	530	15	-	-40	85	14, 10	MSOP, SOICN
ISL83088E	4.5	5.5	10	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL43485	3	3.6	30	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL4485E	4.5	5.5	20	Half	32	2.3	500	15	-	-40	85	8	SOICN
ISL4489E	4.5	5.5	0.25	Full	256	2.3	140	15	-	-40	85	14	SOICN
ISL81483	4.5	5.5	0.25	Half	256	2.3	120	7	-	-40	85	8	PDIP, SOICN
ISL81487	4.5	5.5	5	Half	256	2.3	350	7	-	-40	85	8	SOICN
ISL81487E	4.5	5.5	5	Half	256	2.3	350	15	-	-40	85	8	PDIP, SOICN
ISL81487L	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	PDIP, SOICN
ISL83483	3	3.6	0.25	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL83485	3	3.6	10	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL83488	3	3.6	0.25	Full	32	2.3	650	-	-	-40	85	8	SOICN
ISL83490	3	3.6	10	Full	32	2.3	650	-	-	-40	85	8	SOICN
ISL83491	3	3.6	10	Full	32	2.3	650	-	-	-40	85	14	SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL8483E	4.5	5.5	0.25	Half	32	2.3	160	15	-	-40	85	8	SOICN
ISL8485	4.5	5.5	5	Half	32	2.3	500	7	-	-40	85	8	SOICN
ISL8485E	4.5	5.5	10	Half	32	2.3	500	15	-	-40	125	8	SOICN
ISL8487E	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	SOICN
ISL8488E	4.5	5.5	0.25	Full	32	2.3	120	15	-	-40	85	8	SOICN
ISL8489E	4.5	5.5	0.25	Full	32	2.3	140	15	-	-40	85	14	SOICN
ISL8490	4.5	5.5	5	Full	32	2.3	500	7	-	-40	85	8	SOICN
ISL8490E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	8	SOICN
ISL8491E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	14	SOICN
ISL3179E	3	3.6	40	Half	160	2.1	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3180E	3	3.6	40	Full	160	2.1	2600	12	-	-40	85	14	SOICN

A.6 Low-Power Transceivers (I_{CC} ≥ 550µA)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL32600E	2.7	3.6	0.256	Full	256	1.7	46	12	-	-40	125	10	MSOP
ISL32601E	2.7	3.6	0.256	Half	256	1.7	46	15	-	-40	125	8	MSOP, SOICN
ISL81483	4.5	5.5	0.25	Half	256	2.3	120	7	-	-40	85	8	PDIP, SOICN
ISL81487L	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	PDIP, SOICN
ISL8487E	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	SOICN
ISL8488E	4.5	5.5	0.25	Full	32	2.3	120	15	-	-40	85	8	SOICN
ISL32603E	1.8	3.6	0.46	Half	256	1.7	125	15	-	-40	125	8	MSOP
ISL4489E	4.5	5.5	0.25	Full	256	2.3	140	15	-	-40	85	14	SOICN
ISL8489E	4.5	5.5	0.25	Full	32	2.3	140	15	-	-40	85	14	SOICN
ISL8483E	4.5	5.5	0.25	Half	32	2.3	160	15	-	-40	85	8	SOICN
ISL81487	4.5	5.5	5	Half	256	2.3	350	7	-	-40	85	8	SOICN
ISL81487E	4.5	5.5	5	Half	256	2.3	350	15	-	-40	85	8	PDIP, SOICN
ISL8490E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	8	SOICN
ISL8491E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	14	SOICN
ISL3170E	3	3.6	0.25	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3172E	3	3.6	0.25	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3173E	3	3.6	0.5	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3175E	3	3.6	0.5	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3176E	3	3.6	20	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3178E	3	3.6	20	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL83070E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83071E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83072E	3	3.6	0.25	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83075E	3	3.6	0.5	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83076E	3	3.6	20	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83077E	3	3.6	20	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83078E	3	3.6	20	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL4485E	4.5	5.5	20	Half	32	2.3	500	15	-	-40	85	8	SOICN
ISL8485	4.5	5.5	5	Half	32	2.3	500	7	-	-40	85	8	SOICN
ISL8485E	4.5	5.5	10	Half	32	2.3	500	15	-	-40	125	8	SOICN
ISL8490	4.5	5.5	5	Full	32	2.3	500	7	-	-40	85	8	SOICN
ISL3171E	3	3.6	0.25	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3174E	3	3.6	0.5	Full	256	2	510	12	3	-40	85	8	MSOP
ISL3177E	3	3.6	20	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL83080E	4.5	5.5	0.115	Full	256	2.4	530	15	-	-40	85	14	SOICN
ISL83082E	4.5	5.5	0.115	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83083E	4.5	5.5	0.5	Full	256	2.4	530	15	-	-40	85	10	MSOP
ISL83085E	4.5	5.5	0.5	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83086E	4.5	5.5	10	Full	256	2.4	530	15	-	-40	85	14, 10	MSOP, SOICN
ISL83088E	4.5	5.5	10	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN

A.7 Transceivers with V_{CC} = 5V

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3159E	4.5	5.5	40	Half	160	2.8	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3160E	4.5	5.5	40	Full	160	2.8	2600	10	-	-40	125	14	SOICN
ISL3259E	4.5	5.5	100	Half	160	2.8	2600	16.5	-	-40	85	8, 10	DFN, MSOP, SOICN
ISL4485E	4.5	5.5	20	Half	32	2.3	500	15	-	-40	85	8	SOICN
ISL4489E	4.5	5.5	0.25	Full	256	2.3	140	15	-	-40	85	14	SOICN
ISL81483	4.5	5.5	0.25	Half	256	2.3	120	7	-	-40	85	8	PDIP, SOICN
ISL81487	4.5	5.5	5	Half	256	2.3	350	7	-	-40	85	8	SOICN
ISL81487E	4.5	5.5	5	Half	256	2.3	350	15	-	-40	85	8	PDIP, SOICN
ISL81487L	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	PDIP, SOICN
ISL83080E	4.5	5.5	0.115	Full	256	2.4	530	15	-	-40	85	14	SOICN
ISL83082E	4.5	5.5	0.115	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83083E	4.5	5.5	0.5	Full	256	2.4	530	15	-	-40	85	10	MSOP
ISL83085E	4.5	5.5	0.5	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83086E	4.5	5.5	10	Full	256	2.4	530	15	-	-40	85	14, 10	MSOP, SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL83088E	4.5	5.5	10	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL8483E	4.5	5.5	0.25	Half	32	2.3	160	15	-	-40	85	8	SOICN
ISL8485	4.5	5.5	5	Half	32	2.3	500	7	-	-40	85	8	SOICN
ISL8485E	4.5	5.5	10	Half	32	2.3	500	15	-	-40	125	8	SOICN
ISL8487E	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	SOICN
ISL8488E	4.5	5.5	0.25	Full	32	2.3	120	15	-	-40	85	8	SOICN
ISL8489E	4.5	5.5	0.25	Full	32	2.3	140	15	-	-40	85	14	SOICN
ISL8490	4.5	5.5	5	Full	32	2.3	500	7	-	-40	85	8	SOICN
ISL8490E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	8	SOICN
ISL8491E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	14	SOICN

A.8 Transceivers with $V_{CC} \leq 3.3V$

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3170E	3	3.6	0.25	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3171E	3	3.6	0.25	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3172E	3	3.6	0.25	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3173E	3	3.6	0.5	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3174E	3	3.6	0.5	Full	256	2	510	12	3	-40	85	8	MSOP
ISL3175E	3	3.6	0.5	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3176E	3	3.6	20	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3177E	3	3.6	20	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3178E	3	3.6	20	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3179E	3	3.6	40	Half	160	2.1	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3180E	3	3.6	40	Full	160	2.1	2600	12	-	-40	85	14	SOICN
ISL32600E	2.7	3.6	0.256	Full	256	1.7	46	12	-	-40	125	10	MSOP
ISL32601E	2.7	3.6	0.256	Half	256	1.7	46	15	-	-40	125	8	MSOP, SOICN
ISL32603E	1.8	3.6	0.46	Half	256	1.7	125	15	-	-40	125	8	MSOP
ISL43485	3	3.6	30	Half	32	2.3	650	-	-	-40	85	8	SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL83070E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83071E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83072E	3	3.6	0.25	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83075E	3	3.6	0.5	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83076E	3	3.6	20	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83077E	3	3.6	20	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83078E	3	3.6	20	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83483	3	3.6	0.25	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL83485	3	3.6	10	Half	32	2.3	650	-	-	-40	85	8	SOICN
ISL83488	3	3.6	0.25	Full	32	2.3	650	-	-	-40	85	8	SOICN
ISL83490	3	3.6	10	Full	32	2.3	650	-	-	-40	85	8	SOICN
ISL83491	3	3.6	10	Full	32	2.3	650	-	-	-40	85	14	SOICN

A.9 Transceivers with V_{CC} = 3V to 5V

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	Duplex	DR (Mbps)	V_{CM} (±V)	OVP (±V)	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	Devices allowed on Bus	ESD (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL32452E	3	5.5	Half	0.25	20	60	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32455E	3	5.5	Half	1	20	60	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32457E	3	5.5	Half	0.25	20	60	2.3	2.1	128	15	-40	85	8	SOICN
ISL32458E	3	5.5	Half	20	20	60	2.3	2.1	128	15	-40	85	8	SOICN
ISL32459E	3	5.5	Half	20	20	60	2.3	2.1	128	15	-40	85	8	SOICN
ISL32432E	3	5.5	Half	0.25	15	40	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32433E	3	5.5	Full	1	15	40	2.3	2.1	128	15	-40	85	10	MSOP
ISL32435E	3	5.5	Half	1	15	40	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32437E	3	5.5	Half	0.25	15	40	2.3	2.1	128	15	-40	85	8	MSOP, SOICN

A.10 Overvoltage-Protected Transceivers (OVP = ±40V to ±60V)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	Duplex	DR (Mbps)	OVP (±V)	V_{CM} (±V)	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	Devices allowed on Bus	ESD (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL32432E	3	5.5	Half	0.25	40	15	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32433E	3	5.5	Full	1	40	15	2.3	2.1	128	15	-40	85	10	MSOP
ISL32435E	3	5.5	Half	1	40	15	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32452E	3	5.5	Half	0.25	60	20	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32455E	3	5.5	Half	1	60	20	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32458E	3	5.5	Half	20	60	20	2.3	2.1	128	15	-40	85	8	SOICN
ISL32492E	4.5	5.5	Half	0.25	60	25	2.5	2.3	128	16.5	-40	85	8	MSOP, SOICN
ISL32495E	4.5	5.5	Half	1	60	25	2.5	2.3	128	16.5	-40	85	8	MSOP, SOICN
ISL32496E	4.5	5.5	Full	15	60	25	2.5	2.3	128	16.5	-40	85	14, 10	MSOP, SOICN
ISL32498E	4.5	5.5	Half	15	60	25	2.5	2.3	128	16.5	-40	85	8	MSOP, SOICN
ISL32470E	4.5	5.5	Full	0.25	60	15	2.5	2.3	128	16.5	-40	85	14	SOICN
ISL32472E	4.5	5.5	Half	0.25	60	15	2.5	2.3	128	16.5	-40	85	8	SOICN
ISL32475E	4.5	5.5	Half	1	60	15	2.5	2.3	128	16.5	-40	85	8	SOICN
ISL32478E	4.5	5.5	Half	15	60	15	2.5	2.3	128	16.5	-40	85	8	SOICN

A.11 Overvoltage-Protected Transceivers with Cable Invert Function

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	Duplex	DR (Mbps)	OVP (±V)	V_{CM} (±V)	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	Devices allowed on Bus	ESD (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL32437E	3	5.5	Half	0.25	40	15	2.3	2.1	128	15	-40	85	8	MSOP, SOICN
ISL32457E	3	5.5	Half	0.25	60	20	2.3	2.1	128	15	-40	85	8	SOICN
ISL32459E	3	5.5	Half	20	60	20	2.3	2.1	128	15	-40	85	8	SOICN
ISL32485E	4.5	5.5	Half	1	60	25	2.5	2.3	128	16.5	-40	85	8	SOICN

A.12 Transceivers with High ESD (ESD ≥ 10kV)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3159E	4.5	5.5	40	Half	160	2.8	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3179E	3	3.6	40	Half	160	2.1	2600	16.5	-	-40	125	8, 10	DFN, MSOP, SOICN
ISL3259E	4.5	5.5	100	Half	160	2.8	2600	16.5	-	-40	85	8, 10	DFN, MSOP, SOICN
ISL3172E	3	3.6	0.25	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3175E	3	3.6	0.5	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3178E	3	3.6	20	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL32601E	2.7	3.6	0.256	Half	256	1.7	46	15	-	-40	125	8	MSOP, SOICN
ISL32603E	1.8	3.6	0.46	Half	256	1.7	125	15	-	-40	125	8	MSOP
ISL4485E	4.5	5.5	20	Half	32	2.3	500	15	-	-40	85	8	SOICN
ISL4489E	4.5	5.5	0.25	Full	256	2.3	140	15	-	-40	85	14	SOICN
ISL81487E	4.5	5.5	5	Half	256	2.3	350	15	-	-40	85	8	PDIP, SOICN
ISL81487L	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	PDIP, SOICN
ISL83070E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83071E	3	3.6	0.25	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83072E	3	3.6	0.25	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83075E	3	3.6	0.5	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN
ISL83076E	3	3.6	20	Full	256	2	480	15	-	-40	85	14	SOICN
ISL83077E	3	3.6	20	Full	256	2	480	15	-	-40	85	8	SOICN
ISL83078E	3	3.6	20	Half	256	2	480	15	-	-40	85	8	MSOP, SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL83080E	4.5	5.5	0.115	Full	256	2.4	530	15	-	-40	85	14	SOICN
ISL83082E	4.5	5.5	0.115	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83083E	4.5	5.5	0.5	Full	256	2.4	530	15	-	-40	85	10	MSOP
ISL83085E	4.5	5.5	0.5	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL83086E	4.5	5.5	10	Full	256	2.4	530	15	-	-40	85	14, 10	MSOP, SOICN
ISL83088E	4.5	5.5	10	Half	256	2.4	530	15	-	-40	85	8	MSOP, SOICN
ISL8483E	4.5	5.5	0.25	Half	32	2.3	160	15	-	-40	85	8	SOICN
ISL8485E	4.5	5.5	10	Half	32	2.3	500	15	-	-40	125	8	SOICN
ISL8487E	4.5	5.5	0.25	Half	256	2.3	120	15	-	-40	85	8	SOICN
ISL8488E	4.5	5.5	0.25	Full	32	2.3	120	15	-	-40	85	8	SOICN
ISL8489E	4.5	5.5	0.25	Full	32	2.3	140	15	-	-40	85	14	SOICN
ISL8490E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	8	SOICN
ISL8491E	4.5	5.5	10	Full	32	2.3	370	15	-	-40	85	14	SOICN
ISL3170E	3	3.6	0.25	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3171E	3	3.6	0.25	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3173E	3	3.6	0.5	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3174E	3	3.6	0.5	Full	256	2	510	12	3	-40	85	8	MSOP
ISL3176E	3	3.6	20	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3177E	3	3.6	20	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3180E	3	3.6	40	Full	160	2.1	2600	12	-	-40	85	14	SOICN
ISL32600E	2.7	3.6	0.256	Full	256	1.7	46	12	-	-40	125	10	MSOP
ISL3160E	4.5	5.5	40	Full	160	2.8	2600	10	-	-40	125	14	SOICN

A.13 Transceivers with High EFT (EFT > 2.5kV)

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3150E	4.5	5.5	0.115	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3152E	4.5	5.5	0.115	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3153E	4.5	5.5	1	Full	256	3.1	550	16.5	4	-40	85	10	MSOP
ISL3155E	4.5	5.5	1	Half	256	3.1	550	16.5	4	-40	85	8	SOICN

Part Number	V_{CC} (Min) (V)	V_{CC} (Max) (V)	DR (Mbps)	Duplex	Devices allowed on Bus	V_{OD} (Typ) (V)	I_{CC} (Typ) (RCV on) (µA)	ESD (±kV)	EFT (±kV)	Tmin (°C)	Tmax (°C)	Lead (#)	Pkg. Type
ISL3156E	4.5	5.5	20	Full	256	3.1	550	16.5	4	-40	85	14, 10	MSOP, SOICN
ISL3158E	4.5	5.5	20	Half	256	3.1	550	16.5	4	-40	85	8	MSOP, SOICN
ISL3170E	3	3.6	0.25	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3171E	3	3.6	0.25	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3172E	3	3.6	0.25	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3173E	3	3.6	0.5	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3174E	3	3.6	0.5	Full	256	2	510	12	3	-40	85	8	MSOP
ISL3175E	3	3.6	0.5	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN
ISL3176E	3	3.6	20	Full	256	2	480	12	3	-40	85	14, 10	MSOP, SOICN
ISL3177E	3	3.6	20	Full	256	2	510	12	3	-40	85	8	MSOP, SOICN
ISL3178E	3	3.6	20	Half	256	2	480	15	3	-40	85	8	MSOP, SOICN

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers skilled in the art designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only for development of an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising out of your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use o any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.0 Mar 2020)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan

www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:

www.renesas.com/contact/

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

© 2023 Renesas Electronics Corporation. All rights reserved.