RS90LV048 3-V LVDS Quad CMOS Differential Line Receiver

1 FEATURES

- **Conforms to TIA/EIA-644 Standard**
- **＞400Mbps (200MHz) Switching Rates**
- **100ps Differential Skew**
- **3.3V Power Supply**
- **±350mV Differential Signaling**
- **Supports Input Failsafe Open, Short, and Terminated**
- **Low Power Dissipation (52.8Mw at V_{CC}=3.3V Typical)**
- **TSSOP16 Package**
- **Industrial Temperature Operating Range (-40°C ~85°C)**

2 APPLICATIONS

- **Multifunction Printers**
- **LVDS-LVCMOS Translation**

3 ADVANTAGES

>200MHz Switching Rates.

Accept small input swing (±350mV typically).

52.8mW low power dissipation.

support open, shorted, and terminated (100Ω) input fail-safe.

TSSOP16 Package.

Device Information (1)

PART NUMBER	PACKAGE	BODY SIZE(NOM)
RS90LV048	TSSOP16	5.00mm×4.40mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

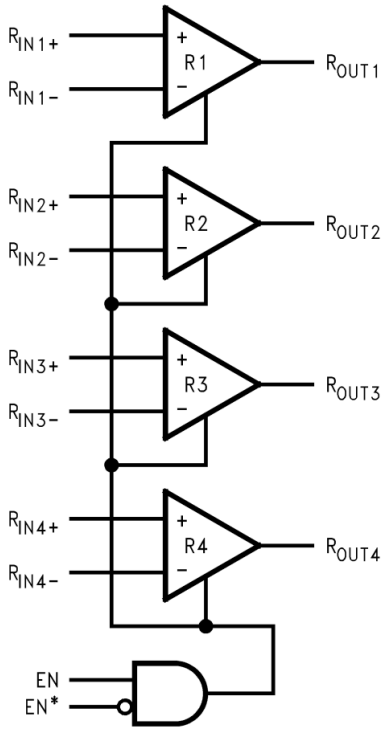


Figure 1. Functional Diagram

Table of Contents

4 REVISION HISTORY

Note: Page numbers for previous revisions may different from page numbers in the current version.

VERSION	Change Date	Change Item
A.0	2024/11/12	Initial version
A.1	2024/12/05	Add machine test results

5 PACKAGE/ORDERING INFORMATION (1)

PRODUCT	ORDERING NUMBER	PACKAGE LEAD	TEMPERATURE RANGE	PACKAGE MARKING (2)	MSL (3)	PACKAGE OPTION
RS90LV048	RS90LV048YTSS16	TSSOP16	-40°C ~85°C	RS90LV048	MSL1	Tape and Reel,4000

NOTE:

(1) This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the right-hand navigation.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) RUNIC classify the MSL level with using the common preconditioning setting in our assembly factory conforming to the JEDEC industrial standard J-STD-20F, Please align with RUNIC if your end application is quite critical to the preconditioning setting or if you have special requirement.

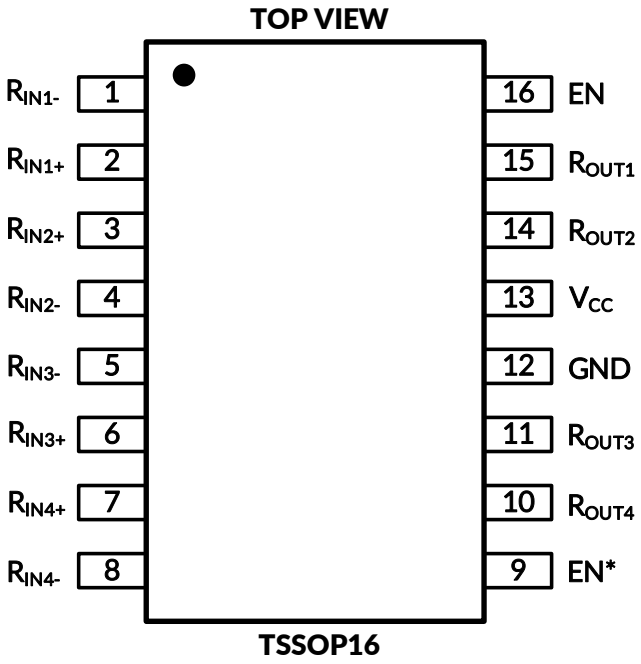
6 DESCRIPTION

The RS90LV048 device is a quad CMOS flow through differential line receiver designed for applications requiring ultra-low power dissipation and high data rates. The device is designed to support data rates in excess of 400 Mbps (200 MHz) using Low Voltage Differential Signaling (LVDS) technology.

The RS90LV048 accepts low voltage (350 mV typical) differential input signals and translates them to 3-V CMOS output levels. The receiver supports a TRI-STATE function that may be used to multiplex outputs. The receiver also supports open, shorted, and terminated (100-Ω) input fail-safe. The receiver output is HIGH for all fail-safe conditions.

The EN and EN* inputs are ANDed together and control the TRI-STATE outputs. The enables are common to all four receivers. The RS90LV048 and companion LVDS line driver (for example, RS90LV047) provide a new alternative to high power PECL/ECL devices for high-speed point-to point interface applications.

7 PIN CONFIGURATIONS



PIN DESCRIPTIONS

Name	PIN	DESCRIPTION
EN	16	Receiver enable pin: When EN is low, the receiver is disabled. When EN is high and EN* is low or open, the receiver is enabled. If both EN and EN* are open circuit, then the receiver is disabled.
EN*	9	Receiver enable pin: When EN* is high, the receiver is disabled. When EN* is low or open and EN is high, the receiver is enabled. If both EN and EN* are open circuit, then the receiver is disabled.
GND	12	Ground pin
R_{IN+}	2,3,6,7	Noninverting receiver input pin
R_{IN-}	1,4,5,8	inverting receiver input pin
R_{OUT}	10, 11, 14,15	Receiver output pin
V_{CC}	13	Power supply pin, 3.3 V ± 0.3 V

8 SPECIFICATIONS

8.1 Absolute Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{CC})	-0.3	4	V
Input voltage (R_{IN+}, R_{IN-})	-0.3	3.6	V
Enable input voltage (EN, EN*)	-0.3	V_{CC}+0.3	V
Output voltage (R_{OUT})	-0.3	V_{CC}+0.3	V
Maximum Junction Temperature		150	°C
Storage temperature	-65	150	°C

Note: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be specified. They are not meant to imply that the devices should be operated at these limits.

8.2 Recommended Operating Conditions

	MIN	TYP	MAX	UNIT
Supply Voltage (V_{CC})	3	3.3	3.6	V
Temperature (T_A)	-40	25	85	°C

8.3 ESD Ratings

The following ESD information is provided for handling of ESD-sensitive devices in an ESD protected area only.

		VALUE	UNIT
$V_{(ESD)}$	Human-Body Model (HBM)	≥8000	V
	Charged-Device Model (CDM)	≥2000	V
	Latch-Up (LU)	≥400	mA

Electric devices and circuit boards may discharge undetected. Although this product has a patented or proprietary protection circuit, the device may be damaged when exposed to high energy ESD. Therefore, appropriate ESD prevention measures should be taken to avoid device performance degradation or loss of function.

8.4 Electrical Characteristics

Over Supply Voltage and Operating Temperature ranges, unless otherwise specified. V_{CC}=+3.3V±10%，T_A= -40°C to 85°C.

SYMBOL	PARAMETER	CONDITION		MIN	TYP	MAX	UNIT
V_{TH}	Differential input high threshold	V_{CM}=+1.2V, 0.05V, 2.95V	R_{IN+}, R_{IN-}		-35	0	mV
V_{TL}	Differential input low threshold			-100	-35		mV
V_{CMR}	Common-mode voltage	V_{ID}=200mV		0.1		2.3	V
I_{IN}	Input current	V_{IN}=+2.8V, V_{CC}=3.6V or 0V		-10	±4.3	10	µA
		V_{IN}=0V, V_{CC}=3.6V or 0V		-10	±3	10	
		V_{IN}=+3.6V, V_{CC}= 0V		-10	±1	20	
V_{OH}	Output high voltage	I_{OH}=-0.4mA, V_{ID}=200mV	R_{OUT}	2.7	3.3		V
		I_{OH}=-0.4mA, input terminated		2.7	3.3		V
		I_{OH}=-0.4mA, input shorted		2.7	3.3		V
V_{OL}	Output low voltage	I_{OH}=2mA, V_{ID}=-200mV			0.05	0.25	V
I_{OS}	Output short-circuit current	Enabled, V_{OUT}=0V		-15	-44.3	-100	mA
I_{OZ}	Output TRI-STATE current	Disabled,， V_{OUT}=0 or V_{CC}		-10	±1	10	µA
V_{IH}	Input high voltage		EN, EN*	2		V_{CC}	V
V_{IL}	Input low voltage			GND		0.8	V
I_I	Input current	V_{IN}=0V or V_{CC}, other Input =V_{CC} or GND		-10	±4.7	10	µA
I_{CC}	No load supply current receivers enabled	EN=V_{CC}, input open	V_{CC}		16	20.3	mA
I_{CCZ}	No load supply current receivers disabled	EN=GND, input open			0.68	5	mA

Note:

1. Current into device pins is defined as positive. Current out of device pins is defined as negative.
2. All typical are given for: V_{CC}=3.3V and T_A=25°C.

8.5 Switching Characteristics

SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
t_{PHLD}	Differential propagation delay high to low	C_L=15pF V_{ID}=200mV	1.5	1.7	2.7	ns
t_{PLHD}	Differential propagation delay low to high		1.3	1.6	2.7	ns
t_{SKD1}	$\|t_{PHLD}- t_{PLHD}\|$			0.1	0.4	ns
t_{TLH}	Rise time		0.3	0.5	0.8	ns
t_{THL}	Fall time		0.2	0.3	0.8	ns
t_{PHZ}	Disable time high to Z	R_L=2kΩ C_L=15pF		10	14	ns
t_{PLZ}	Disable time low to Z			10	14	ns
t_{PZH}	Enable time Z to high			7	14	ns
t_{PZL}	Enable time Z to low			7	14	ns
f_{MAX}	Maximum operating frequency	All channels switching	200	250		MHz

Note:

1. Generator waveform for all tests unless otherwise specified: f = 1 MHz, Z_O = 50 Ω, t_r and t_f (0% to 100%) ≤3 ns for R_{IN}.

2. f_{MAX} generator input conditions: t_r = t_f <1 ns (0%-100%), 50% duty cycle, differential (1.05-V to 1.35-V peak to peak). Output criteria:60 / 40% duty cycle, V_{OL} (maximum 0.25 V), V_{OH} (minimum 2.7 V), Load = 15 pF (stray plus probes).

9 TEST CIRCUITS AND TRANSITION TIME WAVEFORMS

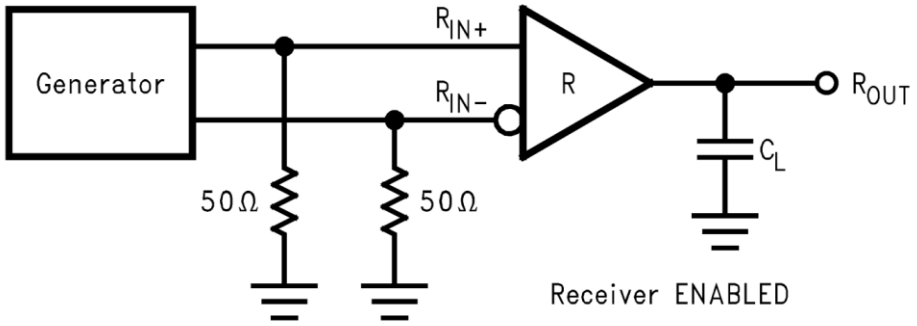


Figure 2. Differential Driver DC Test Circuit

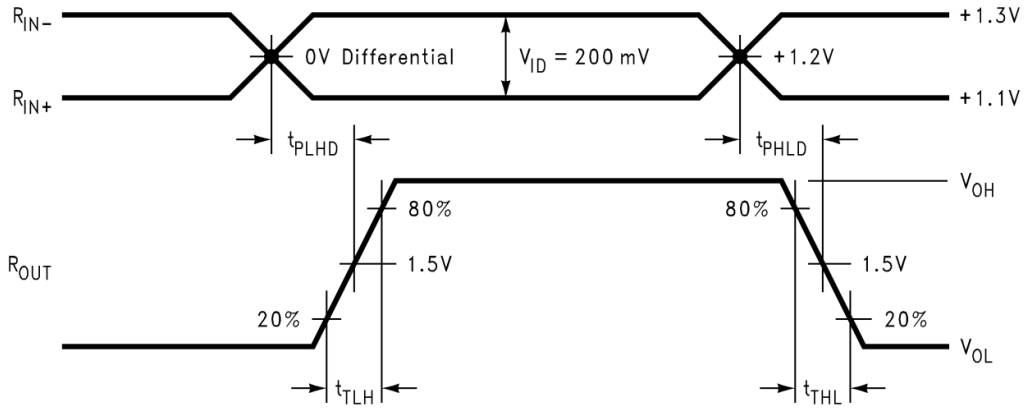
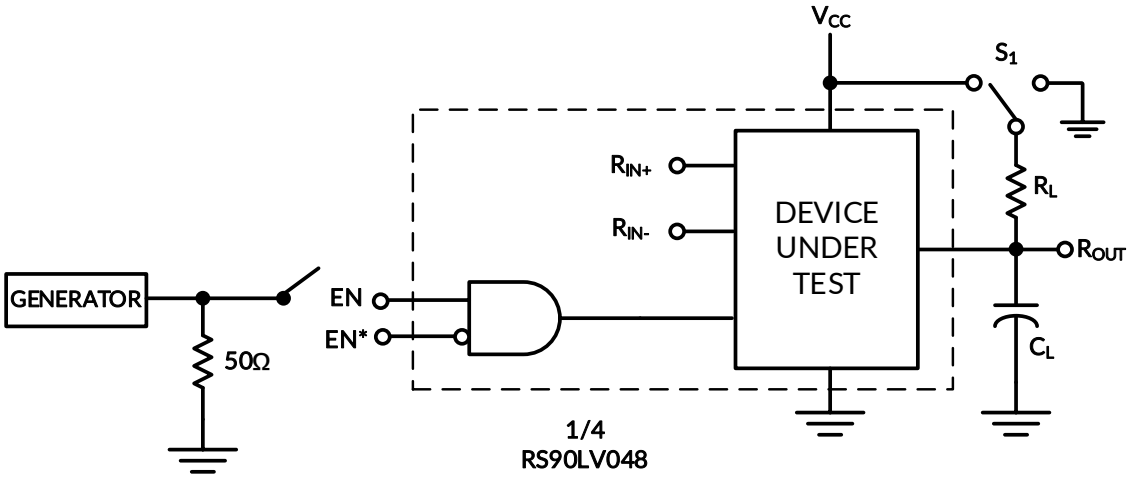


Figure 3. Differential Driver Propagation Delay and Transition Time Test Circuit



C_L includes load and test jig capacitance.
S_1=V_{CC} for t_{PZL} and t_{PL} measurement.
S_1=GND for t_{PZH} and t_{PHZ} measurement.

Figure 4. Differential Driver Propagation Delay and Transition Time Waveforms

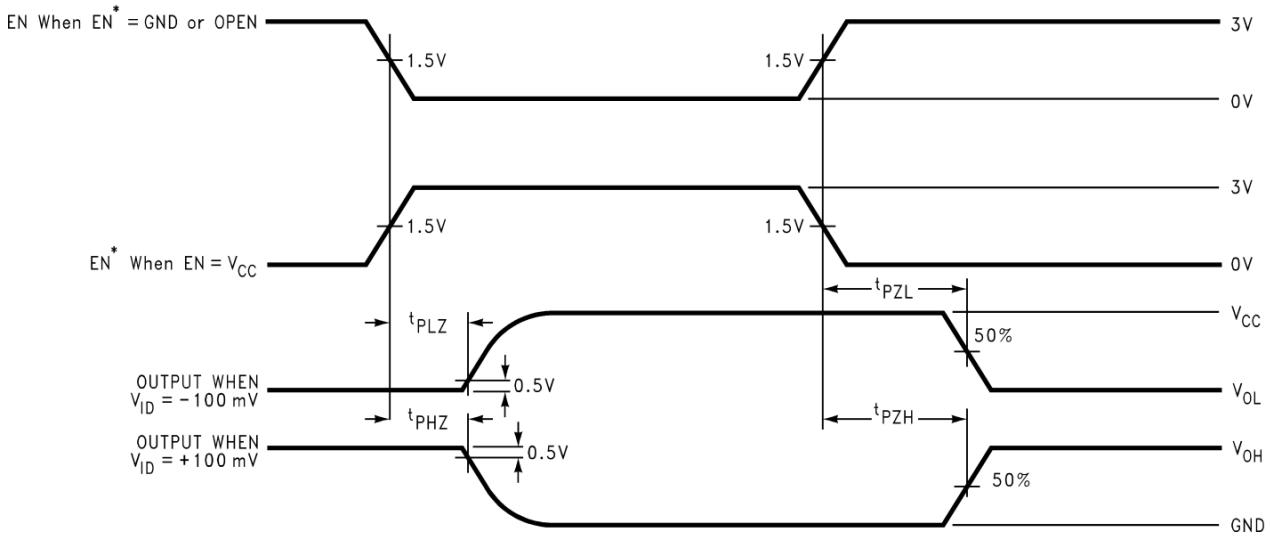


Figure 5. Driver TRI-STATE Delay Test Circuit

10 DEVICE FUNCTIONAL MODES

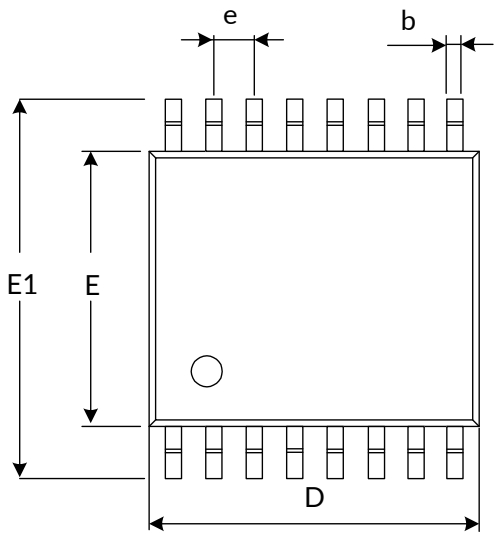
Table 1 lists the functional modes RS90LV048.

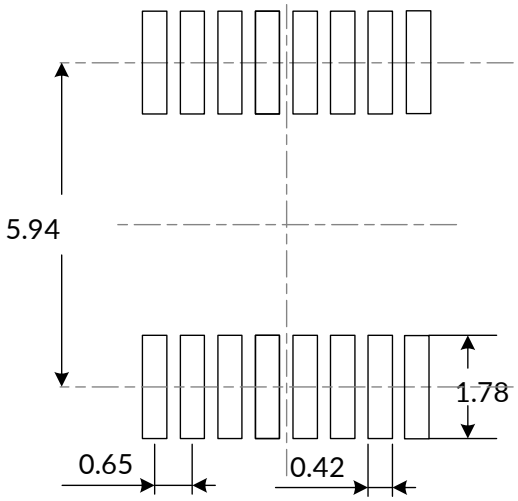
Table 1. functional modes

		INPUT	OUTPUT
EN	**EN***	**R_{IN+}-R_{IN-}**	**R_{OUT}**
H	L or Open	V_{ID}≥0 V	H
		V_{ID}≤-0.1 V	L
		Full Fail-safe open/short or terminated	H
All other combinations of ENABLE inputs		X	Z

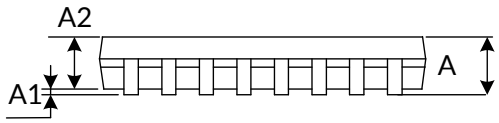
11 PACKAGE OUTLINE DIMENSIONS

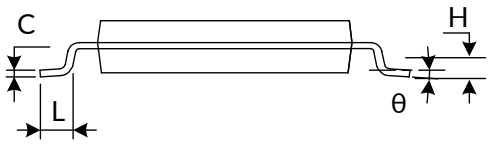
TSSOP16 (3)





RECOMMENDED LAND PATTERN (Unit: mm)





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A (1)		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D (1)	4.860	5.100	0.191	0.201
E (1)	4.300	4.500	0.169	0.177
E1	6.200	6.600	0.244	0.260
e	0.650(BSC) (2)		0.026(BSC) (2)	
L	0.500	0.700	0.02	0.028
H	0.250 TYP		0.010 TYP	
θ	1°	7°	1°	7°

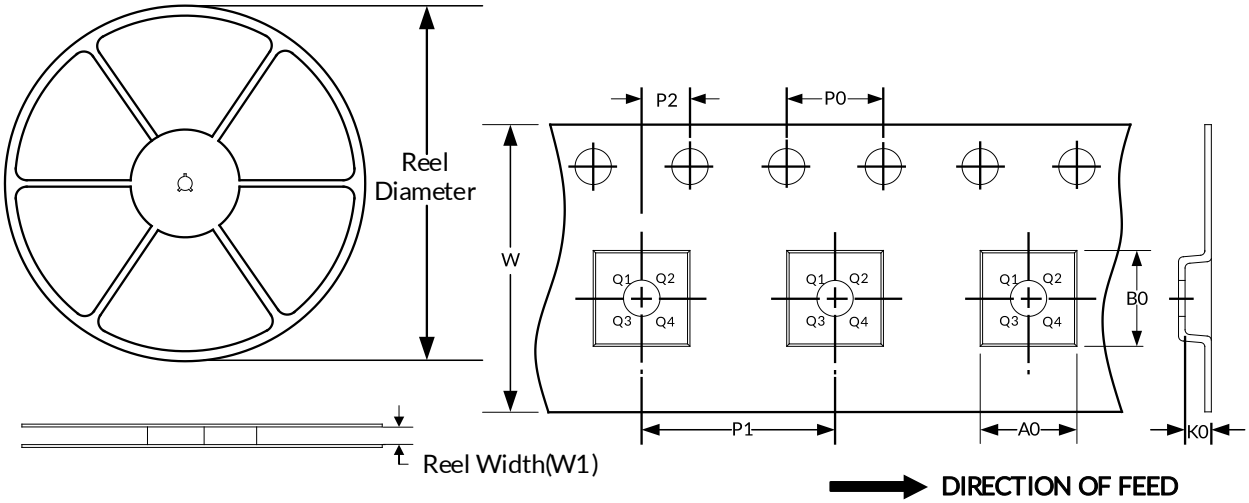
NOTE:

1. Plastic or metal protrusions of 0.15mm maximum per side are not included.
2. BSC (Basic Spacing between Centers), "Basic" spacing is nominal.
3. This drawing is subject to change without notice.

12 TAPE AND REEL INFORMATION

REEL DIMENSIONS

TAPE DIMENSION



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP16	13"	12.4	6.90	5.60	1.20	4.0	8.0	2.0	12.0	Q1

NOTE:
1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.

IMPORTANT NOTICE AND DISCLAIMER

Jiangsu RUNIC Technology Co., Ltd. will accurately and reliably provide technical and reliability data (including data sheets), design resources (including reference designs), application or other design advice, WEB tools, safety information and other resources, without warranty of any defect, and will not make any express or implied warranty, including but not limited to the warranty of merchantability Implied warranty that it is suitable for a specific purpose or does not infringe the intellectual property rights of any third party.

These resources are intended for skilled developers designing with RUNIC products You will be solely responsible for: (1) Selecting the appropriate products for your application; (2) Designing, validating and testing your application; (3) Ensuring your application meets applicable standards and any other safety, security or other requirements; (4) RUNIC and the RUNIC logo are registered trademarks of RUNIC INCORPORATED. All trademarks are the property of their respective owners; (5) For change details, review the revision history included in any revised document. The resources are subject to change without notice. Our company will not be liable for the use of this product and the infringement of patents or third-party intellectual property rights due to its use.