User's Guide

RC19XXX, 9QXL2001X vs. LMKDB1XXX, CDCDB2000 Drop-In Replacement Guide

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ABSTRACT

Several applications using the Renesas' RC19XXX, 9QXL2001X, and TI's LMKDB1XXX, CDCDB2000 families require several vendors to supply clock buffers, also known as multi-sourcing. The compatible parts in each device family have the same pin-outs but certain differences between the designs. To certify proper operation when completing a drop-in replacement of the RC19XXX/9QXL2001X device families with the LMKDB1XXX/CDCDB2000 device family, certain customer design requirements need to be made on either hardware and or software, depending on the part. Those design requirements and the differences between the parts are highlighted in this document.

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Trademarks

1 Introduction

The RC19XXX/9QXL2001X device families have the same pin-out as the LMKDB1XXX/CDCDB2000 device family. This document compares all pins, features, and registers between the parts, highlighting any differences and stating any key actions required when completing a drop-in replacement. Each part comparison section contains a subsection going through the hardware changes required and another going through the software changes required.

2 RC19020 vs. LMKDB1120 Comparison

2.1 RC19020 vs. LMKDB1120 Pin Comparison

To summarize, when replacing the RC19020 with the LMKDB1120, do not leave the vPWRGD/PWRDN# pin (M6) floating and depend on the internal pulldown resistor on the LMKDB1120. Instead, drive pin M6 low or high through external controllers, or pull pin M6 low or high through external resistors.

PIN				Pin Differences between RC19020 and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19020 with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
Input					
CLKIN_P	CLKIN	G1	I	No differences.	N/A.
CLKIN_N	CLKINb	H1	I		
Output					
CLK0_P	CLK0	J1	O	No difference	N/A.
CLK0_N	CLKb0	K1	O		
CLK1_P	CLK1	L1	O		
CLK1_N	CLKb1	M1	O		
CLK2_P	CLK2	M2	O		
CLK2_N	CLKb2	M3	O		
CLK3_P	CLK3	M4	O		
CLK3_N	CLKb3	M5	O		
CLK4_P	CLK4	M7	O		
CLK4_N	CLKb4	M8	O		
CLK5_P	CLK5	M9	O		
CLK5_N	CLKb5	M10	O		
CLK6_P	CLK6	M11	O		
CLK6_N	CLKb6	M12	O		
CLK7_P	CLK7	L12	O		
CLK7_N	CLKb7	K12	O		
CLK8_P	CLK8	J12	O		
CLK8_N	CLKb8	H12	O		
CLK9_P	CLK9	G12	O		
CLK9_N	CLKb9	F12	O		
CLK10_P	CLK10	D12	O		
CLK10_N	CLKb10	C12	O		
CLK11_P	CLK11	B12	O		
CLK11_N	CLKb11	A12	O		
CLK12_P	CLK12	A11	O		
CLK12_N	CLKb12	A10	O		
CLK13_P	CLK13	A9	O		
CLK13_N	CLKb13	A8	O		
CLK14_P	CLK14	A7	O		
CLK14_N	CLKb14	A6	O		
CLK15_P	CLK15	A5	O		
CLK15_N	CLKb15	A4	O		
CLK16_P	CLK16	A3	O		
CLK16_N	CLKb16	A2	O		
CLK17_P	CLK17	A1	O		
CLK17_N	CLKb17	B1	O		

PIN				Pin Differences between RC19020 and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19020 with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
CLK18_P	CLK18	C1	O	No difference	N/A.
CLK18_N	CLKb18	D1	O		
CLK19_P	CLK19	E1	O		
CLK19_N	CLKb19	F1	O		
Output Enable					
vOE0#/NC	NC	J2	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the RC19020 and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional active low OE function for CLK0, CLK1, CLK2, CLK3, and CLK4. These LMKDB1120 pins have internal pulldown resistors that enable the outputs by default and can be left floating.	N/A.
vOE1#/NC	NC	K2	I		
vOE2#/NC	NC	L3	I		
vOE3#/NC	NC	L6	I		
vOE4#/NC	NC	L9	I		
vOE5#/SBI_IN	OEb5_SBI_IN	L8	I	No differences	
vOE6#/SBI_CLK	OEb6_SBI_CLK	L10	I		
vOE7#	OEb7	K11	I		
vOE8#	OEb8	H11	I		
vOE9#	OEb9	E12	I		
vOE10#/SHFT_LD#	OEb10_SHFT_LDb	E11	I		
vOE11#	OEb11	C11	I		
vOE12#	OEb12	B10	I		
vOE13#/NC	NC	B9	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the RC19020 and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional active low OE function for CLK13, CLK14, CLK15, CLK16, CLK17, CLK18 and CLK19. These LMKDB1120 pins have internal pulldown resistors that enable the outputs by default and can be left floating.	
vOE14#/NC	NC	B7	I		
vOE15#/NC	NC	B5	I		
vOE16#/NC	NC	B3	I		
vOE17#/NC	NC	D2	I		
vOE18#/NC	NC	D11	I		
vOE19#/NC	NC	J11	I		
Communication					
SBI_OUT/NC	SBI_OUT	C2	O	No differences.	N/A.
SMB_DATA	SDATA	L4	I/O		
SMB_CLK	SCLK	L5	I		
vSBI_EN	SBI_ENQ	E2	I		
^vSADR1_tr	SADR_tri1	B8	I		
^vSADR0_tr	SADR_tri0	B4	I		
Power					

PIN				Pin Differences between RC19020 and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19020 with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
VDDA	VDDR	H2	P	**Completing a drop-in replacement does not require any changes on this pin.** The input receiver power supply pin name is different between the RC19020 and the LMKDB1120. TI decided to follow DB2000QL's definition for naming the input receiver power supply pin as *VDDA*.	**No changes are required.** Keep the same power filtering used for the RC19020.
VDD	VDDCLK	B2	P	No differences.	
VDD	VDDCLK	B6	P		
VDD	VDDCLK	B11	P		
VDD	VDDCLK	L2	P		
VDD	VDDCLK	L11	P		
Miscellaneous					
DAP	EPAD	GND	G	No differences.	N/A.
LOS#/NC	LOSb	G11	O		
NC	NC	F2	NC		
NC	NC	F11	NC		
NC	NC	G2	NC		
NC	NC	L7	NC		
vPWRGD/PWRDN#	PWRGD_PWRDNb	M6	I	RC19020 has an internal pullup resistor while LMKDB1120 has an internal pulldown resistor. TI followed DB2000QL's definition which states that the PWRGD/PWRDN# pin requires an internal pulldown resistor.	Do not leave this pin floating and depend on the internal resistor. Drive pin low or high through external controllers, or pull pin low or high through external resistors.

2.2 RC19020 vs. LMKDB1120 Exposed Registers Comparison

There are no differences between the RC19020 and the LMKDB1120 exposed registers.

3 9QXL2001B vs. LMKDB1120 Comparison

3.1 9QXL2001B vs. LMKDB1120 Pin Comparison

To summarize, no hardware changes are required when replacing the 9QXL2001B with the LMKDB1120.

PIN				Pin Differences between 9QXL2001B and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001B with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
Input					
CLKIN_P	DIF_IN	G1	I	No differences.	N/A.
CLKIN_N	DIF_IN#	H1	I		
Output					
CLK0_P	DIF0	J1	O	No difference	N/A
CLK0_N	DIF0#	K1	O		
CLK1_P	DIF1	L1	O		
CLK1_N	DIF1#	M1	O		
CLK2_P	DIF2	M2	O		
CLK2_N	DIF2#	M3	O		
CLK3_P	DIF3	M4	O		
CLK3_N	DIF3#	M5	O		
CLK4_P	DIF4	M7	O		
CLK4_N	DIF4#	M8	O		
CLK5_P	DIF5	M9	O		
CLK5_N	DIF5#	M10	O		
CLK6_P	DIF6	M11	O		
CLK6_N	DIF6#	M12	O		
CLK7_P	DIF7	L12	O		
CLK7_N	DIF7#	K12	O		
CLK8_P	DIF8	J12	O		
CLK8_N	DIF8#	H12	O		
CLK9_P	DIF9	G12	O		
CLK9_N	DIF9#	F12	O		
CLK10_P	DIF10	D12	O		
CLK10_N	DIF10#	C12	O		
CLK11_P	DIF11	B12	O		
CLK11_N	DIF11#	A12	O		
CLK12_P	DIF12	A11	O		
CLK12_N	DIF12#	A10	O		
CLK13_P	DIF13	A9	O		
CLK13_N	DIF13#	A8	O		
CLK14_P	DIF14	A7	O		
CLK14_N	DIF14#	A6	O		
CLK15_P	DIF15	A5	O		
CLK15_N	DIF15#	A4	O		
CLK16_P	DIF16	A3	O		
CLK16_N	DIF16#	A2	O		
CLK17_P	DIF17	A1	O		
CLK17_N	DIF17#	B1	O		
CLK18_P	DIF18	C1	O		

PIN				Pin Differences between 9QXL2001B and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001B with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
CLK18_N	DIF18#	D1	O	No difference	N/A
CLK19_P	DIF19	E1	O		
CLK19_N	DIF19#	F1	O		
Output Enable					
vOE0#/NC	NC	J2	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the 9QXL2001B and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional active low OE function for CLK0, CLK1, CLK2, CLK3, and CLK4. These LMKDB1120 pins have internal pulldown resistors that enable the outputs by default and can be left floating.	N/A.
vOE1#/NC	NC	K2	I		
vOE2#/NC	NC	L3	I		
vOE3#/NC	NC	L6	I		
vOE4#/NC	NC	L9	I		
vOE5#/SBI_IN	vOE5#/DATA	L8	I	No difference	
vOE6#/SBI_CLK	vOE6#/CLK	L10	I		
vOE7#	vOE7#	K11	I		
vOE8#	vOE8#	H11	I		
vOE9#	vOE9#	E12	I		
vOE10#/SHFT_LD#	vOE10#/SHFT_LD#	E11	I		
vOE11#	vOE11#	C11	I		
vOE12#	vOE12#	B10	I		
vOE13#/NC	NC	B9	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the 9QXL2001B and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional active low OE function for CLK13, CLK14, CLK15, CLK16, CLK17, CLK18 and CLK19. These LMKDB1120 pins have internal pulldown resistors that enable the outputs by default and can be left floating.	
vOE14#/NC	NC	B7	I		
vOE15#/NC	NC	B5	I		
vOE16#/NC	NC	B3	I		
vOE17#/NC	NC	D2	I		
vOE18#/NC	NC	D11	I		
vOE19#/NC	NC	J11	I		
Communication					
SBI_OUT/NC	NC	C2	O	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the 9QXL2001B and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional SBI data output function. This pin can be left floating since SBI data output pin is optional and only needed when forming a daisy chain topology.	N/A.
SMB_DATA	SMBDAT	L4	I/O	No differences.	
SMB_CLK	SMBCLK	L5	I		
vSBI_EN	vSBEN	E2	I		
^vSADR1_tr	^vSADR1_tri	B8	I		
^vSADR0_tr	^vSADR0_tri	B4	I		

PIN				Pin Differences between 9QXL2001B and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001B with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
Power					
VDDA	VDDR3.3	H2	P	**Completing a drop-in replacement does not require any changes on this pin.** The input receiver power supply pin name is different between the 9QXL2001B and the LMKDB1120. TI decided to follow DB2000QL's definition for naming the input receiver power supply pin as *VDDA*.	**No changes are required.** Keep the same power filtering used for the 9QXL2001B.
VDD	VDDO3.3	B2	P	No difference	
VDD	VDDA3.3	B6	P	**Completing a drop-in replacement does not require any changes on this pin.** This pin name is different between the 9QXL2001B and the LMKDB1120. TI decided to follow DB2000QL's definition which states that the input receiver power supply pin name is *VDDA*. Pin B6 is not an input receiver power supply pin on the LMKDB1120 and was not labeled as such.	
VDD	VDDO3.3	B11	P	No differences.	
VDD	VDDO3.3	L2	P		
VDD	VDDO3.3	L11	P		
Miscellaneous					
DAP	EPAD	GND	G	No difference	N/A.
LOS#/NC	NC	G11	O	**Completing a drop-in replacement does not require any changes on this pin.** These pins are NC for both the 9QXL2001B and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional LOS# function. This pin is open drain and can be left floating. Open drain outputs require an external pullup resistor to close the current path and generate a signal.	
NC	NC	F2	NC	No differences.	
NC	NC	F11	NC		
NC	NC	G2	NC		
NC	NC	L7	NC		
vPWRGD/PWRDN#	vCKPWRGD_PD#	M6	I		

3.2 9QXL2001B vs. LMKDB1120 Exposed Register Comparison

Note

IMPORTANT: If following the DB2000QL's definition, then the differences highlighted below do not apply to your application.

To summarize:

- The 9QXL2001B and the LMKDB1120 have the same default global output amplitude but different register writes to obtain other global output amplitudes. Refer to register R20[7:4] to correctly program the LMKDB1120 to the desired global output amplitude.
- The LMKDB1120 does not have differential stop mode state control while the 9QXL2001B does. Do not change the POR default of the LMKDB1120 R20[1:0].

BYTE	BITS	TI NAME	RENESAS NAME	Register Differences between 9XQL2001B and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001B with the LMKDB1120
R0	7:0	Output Enable Controls	Output Enable	No difference	N/A.
R1	7:0				
R2	7:0				
R3	7:0	OE Pin Readback	OE# Pin Readback		
R4	7:5	Reserved	Reserved	No difference	
	4	AOD Enable Control	Reserved	**Completing a drop-in replacement does not require any software changes on this bit.** The 9QXL2001B's R4[4] is reserved while the LMKDB1120's R4[4] offers an additional automatic output disable function. The LMKDB1120's default value at POR matches the 9QXL2001B's default.	
	3:1	Reserved	Reserved	No difference	
	0	SBI_EN Readback	SBEN Readback		
R5	7:0	Device Info	Vendor & Revision ID	No difference	
R6	7:0	Device Info (cont.)	Device ID		
R7	7:0	SMBus Byte Counter	Byte Count		
R8	7:0	SBI Mask	Side Bank Mask		
R9	7:0				
R10	7:0				

BYTE	BITS	TI NAME	RENESAS NAME	Register Differences between 9XQL2001B and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001B with the LMKDB1120
R20	7	AMP_1	AMP[2]	The 9QXL2001B global differential output control register (20[7:5]) spreads across 3 bits to represent global output amplitudes from 0.3V through 1V in 100mV step. The LMKDB1120 global differential output control register (R20[7:4]) spreads across 4 bits to represent global output amplitudes from 0.6V through 1V in 25mV steps. Both of these parts have the same default global output amplitude at POR of 0.75V.	If not using the default global output amplitude of the 9QXL2001B, program bits R20[7:4] of the LMKDB1120 as follows: 0h = 600mV 1h = 625mV 2h = 650mV 3h = 675mV 4h = 700mV 5h = 725mV 6h = 750mV 7h = 775mV 8h = 800mV 9h = 825mV Ah = 850mV Bh = 875mV Ch = 900mV Dh = 925mV Eh = 950mV Fh = 975mV
	6		AMP[1]		
	5		AMP[0]		
	4		Reserved		
	3:2	Reserved	Reserved	No difference	N/A.
	1		STOPST[1]	The LMKDB1120 does not have differential stop mode state control like the 9QXL2001B. The default of both parts is the same (set to 0x0 = Low/ Low). TI followed DB200QL's definition differential stop mode default which does not require modifications.	Do not program these registers on the LMKDB1120. Leave the POR value of 0x0 unchanged.
	0		STOPTS[0]		

BYTE	BITS	TI NAME	RENESAS NAME	Register Differences between 9XQL2001B and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001B with the LMKDB1120
R21	7	RX1_EN_AC_INPUT	Reserved	**Completing a drop-in replacement does not require any software changes on these bits.** The 9QXL2001B 21[7:6] are reserved and have the same default POR values as the LMKDB1120. The LMKDB1120 R21[7:6] offer additional input functions: enabling a receiver bias when CLKIN1 is AC coupled and enabling an internal 50Ω input termination on CLKIN1.	N/A.
	6	RX1_EN_RTERM_LSB			
	5:4	Reserved	Reserved	No difference	
	3	PD_RESTORB	PD_RESTORE#		
	2	SDATA_TIMEOUT_EN	Reserved	**Completing a drop-in replacement does not require any software changes on this bit.** The 9QXL2001B 21[2] is reserved while the LMKDB1120 R21[2] offers an additional SMBus SDATA time out monitoring function. The LMKDB1120's default value at POR matches the 9QXL2001B's default.	
	1	Reserved	Reserved	No difference	
	0	LOSb_RB	Reserved	**Completing a drop-in replacement does not require any software changes on this bit.** The 9QXL2001B's 21[0] is reserved while the LMKDB1120's R21[0] offers an additional readback of LOS detect clock output function. The LMKDB1120's default value at POR matches the 9QXL2001B's default.	

4 9QXL2001C vs. LMKDB1120 Comparison

4.1 9QXL2001C vs. LMKDB1120 Pin Comparison

To summarize, no hardware changes are required when replacing the 9QXL2001C with the LMKDB1120.

PIN				Pin Differences between 9QXL2001C and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001C with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
Input					
CLKIN_P	DIF_IN	G1	I	No differences.	N/A.
CLKIN_N	DIF_IN#	H1	I		
Output					
CLK0_P	DIF0	J1	O	No difference	N/A
CLK0_N	DIF0#	K1	O		
CLK1_P	DIF1	L1	O		
CLK1_N	DIF1#	M1	O		
CLK2_P	DIF2	M2	O		
CLK2_N	DIF2#	M3	O		
CLK3_P	DIF3	M4	O		
CLK3_N	DIF3#	M5	O		
CLK4_P	DIF4	M7	O		
CLK4_N	DIF4#	M8	O		
CLK5_P	DIF5	M9	O		
CLK5_N	DIF5#	M10	O		
CLK6_P	DIF6	M11	O		
CLK6_N	DIF6#	M12	O		
CLK7_P	DIF7	L12	O		
CLK7_N	DIF7#	K12	O		
CLK8_P	DIF8	J12	O		
CLK8_N	DIF8#	H12	O		
CLK9_P	DIF9	G12	O		
CLK9_N	DIF9#	F12	O		
CLK10_P	DIF10	D12	O		
CLK10_N	DIF10#	C12	O		
CLK11_P	DIF11	B12	O		
CLK11_N	DIF11#	A12	O		
CLK12_P	DIF12	A11	O		
CLK12_N	DIF12#	A10	O		
CLK13_P	DIF13	A9	O		
CLK13_N	DIF13#	A8	O		
CLK14_P	DIF14	A7	O		
CLK14_N	DIF14#	A6	O		
CLK15_P	DIF15	A5	O		
CLK15_N	DIF15#	A4	O		
CLK16_P	DIF16	A3	O		
CLK16_N	DIF16#	A2	O		
CLK17_P	DIF17	A1	O		
CLK17_N	DIF17#	B1	O		
CLK18_P	DIF18	C1	O		

PIN				Pin Differences between 9QXL2001C and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001C with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
CLK18_N	DIF18#	D1	O	No difference	N/A.
CLK19_P	DIF19	E1	O		
CLK19_N	DIF19#	F1	O		
Output Enable					
vOE0#/NC	NC	J2	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the 9QXL2001C and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional active low OE function for CLK0, CLK1, CLK2, CLK3, and CLK4. These LMKDB1120 pins have internal pulldown resistors that enable the outputs by default and can be left floating.	N/A.
vOE1#/NC	NC	K2	I		
vOE2#/NC	NC	L3	I		
vOE3#/NC	NC	L6	I		
vOE4#/NC	NC	L9	I		
vOE5#/SBI_IN	vOE5#/DATA	L8	I	No differences	
vOE6#/SBI_CLK	vOE6#/CLK	L10	I		
vOE7#	vOE7#	K11	I		
vOE8#	vOE8#	H11	I		
vOE9#	vOE9#	E12	I		
vOE10#/SHFT_LD#	vOE10#/SHFT_LD#	E11	I		
vOE11#	vOE11#	C11	I		
vOE12#	vOE12#	B10	I		
vOE13#/NC	NC	B9	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the 9QXL2001B and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional active low OE function for CLK13, CLK14, CLK15, CLK16, CLK17, CLK18 and CLK19. These LMKDB1120 pins have internal pulldown resistors that enable the outputs by default and can be left floating.	
vOE14#/NC	NC	B7	I		
vOE15#/NC	NC	B5	I		
vOE16#/NC	NC	B3	I		
vOE17#/NC	NC	D2	I		
vOE18#/NC	NC	D11	I		
vOE19#/NC	NC	J11	I		
Communication					
SBI_OUT/NC	NC	C2	O	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the 9QXL2001C and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional SBI output function. This pin can be left floating since SBI data output pin is optional and only needed when forming a daisy chain topology.	N/A.
SMB_DATA	SMBDAT	L4	I/O	No differences.	
SMB_CLK	SMBCLK	L5	I		
vSBI_EN	vSBEN	E2	I		
^vSADR1_tr	^vSADR1_tri	B8	I		
^vSADR0_tr	^vSADR0_tri	B4	I		

PIN				Pin Differences between 9QXL2001C and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001C with the LMKDB1120
TI NAME	RENESAS NAME	NO.	TYPE		
Power					
VDDA	VDDR3.3	H2	P	**Completing a drop-in replacement does not require any changes on this pin. The input receiver power supply pin name is different between the** 9QXL2001C and the LMKDB1120. TI decided to follow DB2000QL's definition for naming the input receiver power supply pin as *VDDA*.	**No changes are required.** Keep the same power filtering used for the 9QXL2001C.
VDD	VDDO3.3	B2	P	No difference	
VDD	VDDA3.3	B6	P	**Completing a drop-in replacement does not require any changes on this pin.** This pin name is different between the 9QXL2001C and the LMKDB1120. TI decided to follow DB2000QL's definition for naming the input receiver power supply pin as *VDDA*. Pin B6 is not an input receiver power supply pin on the LMKDB1120 and was not labeled as such.	
VDD	VDDO3.3	B11	P	No differences.	
VDD	VDDO3.3	L2	P		
VDD	VDDO3.3	L11	P		
Miscellaneous					
DAP	EPAD	GND	G	No difference	N/A.
LOS#/NC	NC	G11	O	**Completing a drop-in replacement does not require any changes on this pin.** These pins are NC for both the 9QXL2001C and the LMKDB1120 and can be left floating. LMKDB1120 offers an additional LOS# function. This pin is open drain and can be left floating. Open drain outputs require an external pullup resistor to close the current path and generate a signal.	
NC	NC	F2	NC	No differences.	
NC	NC	F11	NC		
NC	NC	G2	NC		
NC	NC	L7	NC		
vPWRGD/PWRDN#	vCKPWRGD_PD#	M6	I		

4.2 9QXL2001C vs. LMKDB1120 Exposed Registers Comparison

Note

IMPORTANT: If following the DB2000QL's definition, then the differences highlighted below do not apply to your application.

To summarize, if the 9QXL2001C's default global output amplitude is required, then program R20[7:4] = 7 in the LMKDB1120 to get the same global output amplitude value of 0.775V.

BYTE	BITS	TI NAME	RENESAS NAME	Register Difference between 9XQL2001C and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001C with the LMKDB1120
R0	7:0	Output Enable Controls	Output Enable	No difference	N/A.
R1	7:0				
R2	7:0				
R3	7:0	OE Pin Readback	OE# Pin Readback		
R4	7:5	Reserved	Reserved	No difference	
	4	AOD Enable Control	Reserved	**Completing a drop-in replacement does not require any software changes on this bit.** The 9QXL2001C 's 4[4] is reserved while the LMKDB1120's R4[4] offers an additional automatic output disable function.	
	3:1	Reserved	Reserved	No difference	
	0	SBI_EN Readback	SBEN Readback		
R5	7:0	Device Info	Vendor & Revision ID	No difference	
R6	7:0	Device Info (cont.)	Device ID		
R7	7:0	SMBus Byte Counter	Byte Count		
R8	7:0	SBI Mask	Side Bank Mask		
R9	7:0				
R10	7:0				
R20	7	AMP_1	AMP[3]	9QXL2001C 20[7:4] default is 0x7h (or 0.775V global output amplitude) while the LMKDB1120's R20[7:4] default is 0x6h (or 0.75V global output amplitude). The default global output amplitude bit assignments are the same between the 9QXL2001C and the LMKDB1120.	Program 0x7h to R20[7:4] of the LMKDB1120 to get the default global output amplitude value of the 9QXL2001C (or 0.775V).
	6		AMP[2]		
	5		AMP[1]		
	4		AMP[0]		
	3:0	Reserved	Reserved	No difference	N/A.

BYTE	BITS	TI NAME	RENESAS NAME	Register Difference between 9XQL2001C and LMKDB1120 that Affect Drop-In Replacements	Design Requirements when Replacing the 9QXL2001C with the LMKDB1120
R21	7	RX1_EN_AC_INPUT	Reserved	**Completing a drop-in replacement does not require any software changes on these bits.** The 9QXL2001C 21[7:6] are reserved and have the same default POR value as the LMKDB1120. The LMKDB1120 R21[7:6] offer additional input functions: enabling a receiver bias when CLKIN1 is AC coupled and enabling an internal 50Ω input termination on CLKIN1.	N/A.
	6	RX1_EN_RTERM_LSB			
	5:4	Reserved	Reserved	No difference	
	3	PD_RESTORB	PD_RESTORE#		
	2	SDATA_TIMEOUT_EN	Reserved	**Completing a drop-in replacement does not require any software changes on this bit.** The 9QXL2001C 21[2] is reserved while the LMKDB1120 R21[2] offers an additional SMBus SDATA time out monitoring function. The LMKDB1120's default value at POR matches the 9QXL2001C's default.	
	1	Reserved		No difference	
	0	LOSb_RB		**Completing a drop-in replacement does not require any software changes on this bit.** The 9QXL2001C's 21[0] is reserved while the LMKDB1120's R21[0] offers an additional readback of LOS detect clock output function. The LMKDB1120's default value at POR matches the 9QXL2001C's default.	

5 CDCDB2000 vs. LMKDB1120 Comparison

There are no pin or exposed register differences between the LMKDB1120 and the CDCDB2000. Both parts can be dropped-in for one another with no changes required.

6 RC19008 vs. LMKDB1108 Comparison

6.1 RC19008 vs. LMKDB1108 Pin Comparison

To summarize, when replacing the RC19008 with the LMKDB1108:

- When SBI is disabled, do not leave OE pins floating and depend on the internal pulldown resistors of the OE pins. Instead, drive OE pins low or high through external controllers, or pull OE pins low or high through external resistors.
- Do not leave the vPWRGD/PWRDN# pin (12) floating and depend on the internal pulldown resistor on the LMKDB1108. Instead, drive pin 12 low or high through external controllers, or pull pin 12 low or high through external resistors.

PIN				Pin Differences between RC19008 and LMKDB1108 that Affect Drop-In Replacements		Design Requirements when Replacing the RC19008 with the LMKDB1108	
TI NAME	RENESAS NAME	NO.	TYPE				
Input							
CLKIN_P	CLKIN	8	I	No difference		N/A.	
CLKIN_N	CLKINb	9	I				
Output							
CLK0_P	CLK13	15	O	No difference		N/A.	
CLK0_N	CLKb13	16	O				
CLK1_P	CLK10	17	O				
CLK1_N	CLKb10	18	O				
CLK2_P	CLK7	22	O				
CLK2_N	CLKb7	23	O				
CLK3_P	CLK6	24	O				
CLK3_N	CLKb6	25	O				
CLK4_P	CLK5	28	O				
CLK4_N	CLKb5	29	O				
CLK5_P	CLK3	31	O				
CLK5_N	CLKb3	32	O				
CLK6_P	CLK2	35	O				
CLK6_N	CLKb2	36	O				
CLK7_P	CLK1	38	O				
CLK7_N	CLKb1	39	O				
Output Enable							
vOE0#/SHFT_LD#	OEb13_SHFT_LDb	14	I	**OE mode**	**SBI Mode**	**OE mode**	**SBI Mode**
vOE1#/SBI_IN	OEb10_SBI_IN	19	I	RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI decided to follow DB2000QL's definition which states that the OE pins require internal pulldown resistors.	No difference.	Do not leave these pins floating and depend on the internal resistors. Drive OE pins low or high through external controllers, or pull OE pins low or high through external resistors.	N/A.

PIN				Pin Differences between RC19008 and LMKDB1108 that Affect Drop-In Replacements		Design Requirements when Replacing the RC19008 with the LMKDB1108	
TI NAME	RENESAS NAME	NO.	TYPE				
vOE2#	OEb7	21	I	RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI decided to follow DB2000QL's definition as a guideline which states that the OE pins require internal pulldown resistors.		Do not leave these pins floating and depend on the internal resistor. Drive OE pins low or high through external controllers, or pull OE pins low or high through external resistors.	
vOE3#	OEb6	27	I				
vOE4#/SBI_CLK	OEb5_SBI_CLK	30	I	**OE mode**	**SBI Mode**	**OE mode**	**SBI Mode**
				RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI decided to follow DB2000QL's definition as a guideline which states that the OE pins require internal pulldown resistors.	No difference.	Do not leave this pin floating and depend on the internal pulldown resistor of the LMKDB1108. Drive OE pin low or high through external controllers, or pull OE pin low or high through external resistors.	N/A.
vOE5#	OEb3	33	I	RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI decided to follow DB2000QL's definition as a guideline which states that the OE pins require internal pulldown resistors.		Do not leave this pin floating and depend on the internal resistor. Drive OE pin low or high through external controllers, or pull OE pin low or high through external resistors.	
vOE6#/SBI_OUT	OEb2_SBI_OUT	34	I	**OE mode**	**SBI Mode**	**OE mode**	**SBI Mode**
				RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI decided to follow DB2000QL's definition which states that the OE pins require internal pulldown resistors.	No difference.	Do not leave this pin floating and depend on the internal resistor. Drive OE pin low or high through external controllers, or pull OE pin low or high through external resistors.	N/A.
vOE7#	OEb1	40	I	RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI decided to follow DB2000QL's definition which states that the OE pins require internal pulldown resistors.		Do not leave this pin floating and depend on the internal resistor. Drive OE pin low or high through external controllers, or pull OE pin low or high through external resistors.	
Communication							
SMB_DATA	SDATA	5	I/O	No difference		N/A.	
SMB_CLK	SCLK	6	I				
vSBI_EN	SBI_ENQ	11	I				
^vSADR1_tri	SADR_tri1	3	I				
^vSADR0_tri	SADR_tri0	4	I				
Power							

PIN				Pin Differences between RC19008 and LMKDB1108 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19008 with the LMKDB1108
TI NAME	RENESAS NAME	NO.	TYPE		
VDDA	VDDDIG	7	P	**Completing a drop-in replacement does not require any changes on this pin.** Pin name and function are different between the RC19008 and the LMKDB1108. TI decided to have an input receiver power supply pin to follow DB2000QL's definition as a guideline and name this pin according to this definition. DB2000QL's definition establishes this pin's name as *VDDA*. Renesas does not seem to be following DB2000QL's definition and do not have an input receiver power supply pin for the RC19008.	**No changes are required.** Keep the same power filtering used for the RC19008.
VDD	VDDCLK	10	P	No difference	
VDD	VDDCLK	13	P		
VDD	VDDCLK	20	P		
VDD	VDDCLK	26	P		
VDD	VDDCLK	37	P		
Miscelleneous					
DAP	EPAD	GND/41	G	No difference	N/A.
LOS#	LOSb	1	O		
^SLEWRATE_SEL	SLEWRATE_SEL	2	I		
vPWRGD/PWRDN#	PWRGD_PWRDNb	12	I	RC19008 has an internal pullup resistor while LMKDB1108 has an internal pulldown resistor. TI followed DB2000QL's definition as a guideline which states that the PWRGD/PWRDN# pin requires an internal pulldown resistor.	Do not leave this pin floating and depend on the internal resistor. Drive pin low or high through external controllers, or pull pin low or high through external resistors.

6.2 RC19008 vs. LMKDB1108 Exposed Registers Comparison

Slew rate can be controlled through pin 2, the SLEWRATE_SEL pin, or through software for both the RC19008 and the LMKDB1108; therefore, a logic priority needs to exist. Renesas does not define the logic priority used for the RC19008 or exposes the slew rate selection register. Therefore, TI assumed this as a difference between the RC19008 and the LMKDB1108.

The LMKDB1108 Data Sheet under the *LMKDB1108 Registers* section has more information about this register, R53[5] or SLEWRATE_CTRL_MODE.

7 RC19004 vs. LMKDB1104 Comparison

7.1 RC19004 vs. LMKDB1104 Pin Comparison

To summarize, when replacing the RC19004 with the LMKDB1104:

- When SBI is enabled, do not leave any SBI pins floating and depend on the internal pulldown resistors of these pins of the LMKDB1104. Instead, drive SBI pins low or high through external controllers, or pull SBI pins low or high through external resistors.
- Do not leave the vPWRGD/PWRDN# pin (9) floating and depend on the internal pulldown resistor on the LMKDB1104. Instead, drive pin 9 low or high through external controllers, or pull pin 9 low or high through external resistors.

PIN				Pin Differences between RC19004 and LMKDB1104 that Affect Drop-In Replacements		Design Requirements when Replacing the RC19004 with the LMKDB1104	
TI NAME	RENESAS NAME	NO.	TYPE				
Input							
CLKIN_P	CLKIN	6	I	No difference		N/A	
CLKIN_N	CLKINb	7	I				
Output and Output Enable							
CLK0_P	CLK13	12	O	No difference		N/A.	
CLK0_N	CLKb13	13	O				
CLK1_P	CLK9	16	O				
CLK1_N	CLKb9	17	O				
CLK2_P	CLK5	19	O				
CLK2_N	CLKb5	20	O				
CLK3_P	CLK2	23	O				
CLK3_N	CLKb2	24	O				
vOE0#/SHFT_LD#	OEb13_SHFT_LDb	11	I	**OE mode**	**SBI mode**	**OE mode**	**SBI mode**
vOE1#/SBI_IN	OEb9_SBI_IN	14	I	No difference	RC19004 has an internal pullup resistor while LMKDB1104 has an internal pulldown resistor. TI decided to follow DB2000QL's definition as a guideline which states that the OE pins require internal pulldown resistors.	N/A.	Do not leave these pin floating and depend on the internal resistors. Drive SBI pins low or high through external controllers, or pull SBI pins low or high through external resistors.
vOE2#/SBI_CLK	OEb5_SBI_CLK	21	I				
vOE3#/SBI_OUT	OEb2_SBI_OUT	22	I	No difference		N/A.	
Power							

PIN				Pin Differences between RC19004 and LMKDB1104 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19004 with the LMKDB1104
TI NAME	RENESAS NAME	NO.	TYPE		
VDDA	VDDDIG	5	P	**Completing a drop-in replacement does not require any changes on this pin.** The input receiver power supply pin name and function are different between the RC19004 and the LMKDB1104. TI decided to follow DB2000QL's definition for naming the input receiver power supply pin as *VDDA*.	**No changes are required.** Keep the same power filtering used for the RC19004.
VDD	VDDCLK	10	P	No difference	
VDD	VDDCLK	15	P		
VDD	VDDCLK	18	P		
VDD	VDDCLK	25	P		
Miscellaneous					
^vSADR1_tri	SADR_tri1	1	I	No difference	N/A.
^vSADR0_tri	SADR_tri0	2	I		
SMB_DATA	SDATA	3	I/O		
SMB_CLK	SCLK	4	I		
vSBI_EN	SBI_ENQ	8	I		
vPWRGD/PWRDN#	PWRGD_PWRDNb	9	I	RC19004 has an internal pullup resistor while LMKDB1104 has an internal pulldown resistor. TI followed DB2000QL's definition as a guildeline which states that the PWRGD/PWRDN# pin needs to have an internal pulldown resistor.	Do not leave this pin floating and depend on the internal resistor. Drive pin low or high through external controllers, or pull pin low or high through external resistors.
NC	NC	26	NC	No difference	N/A.
^SLEWRATE_SEL	SLEWRATE_SEL	27	I		
LOS#	LOSb	28	O		
GND	EPAD	DAP/29	G		

7.2 RC19004 vs. LMKDB1104 Exposed Register Comparison

There are no differences between the RC19004 and the LMKDB1104 exposed registers.

8 RC19204 vs. LMKDB1204 Comparison

8.1 RC19204 vs. LMKDB1204 Pin Comparison

To summarize, when replacing the RC19204 with the LMKDB1204, do not leave the vPWRGD/PWRDN# pin (1) floating and depend on the internal pulldown resistor on the LMKDB1204. Instead, drive pin 1 low or high through external controllers, or pull pin 1 low or high through external resistors.

PIN				Pin Differences between RC19204 and LMKDB1204 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19204 with the LMKDB1204
TI NAME	RENESAS NAME	NO.	TYPE		
Input					
CLKIN0_P	CLKIN0	2	I	No difference	N/A
CLKIN0_N	CLKINb0	3	I		
CLKIN1_P	CLKIN1	5	I		
CLKIN1_N	CLKINb1	6	I		
Output and Output Enable					
CLK3_P	CLK12	10	O	No difference	N/A.
CLK3_N	CLKb12	11	O		
CLK2_P	CLK10	13	O		
CLK2_N	CLKb10	14	O		
CLK1_P	CLK5	20	O		
CLK1_N	CLKb5	21	O		
CLK0_P	CLK3	23	O		
CLK0_N	CLKb3	24	O		
^OE3#/SMB_CLK	OEb_G	9	I	**Completing a drop-in replacement does not require any changes on these pins.** This pin is active low OE for both the RC19204 and the LMKDB1204. The LMKDB1204 offers an additional SMBus functionality. When SMBus is enabled, this pin serves as the SMBus clock.	N/A.
^OE2#	OEb_F	16	I	No difference	N/A.
^OE1#	OEb_C	19	I		
^OE0#	OEb_B	25	I		
Power					
VDD_IN0	VDDIN0	4	P	No difference	**No changes are required.** Keep the same power filtering used for the RC19204.
VDD_IN1	VDDINI1	7	P		
VDD_BANK1	VDDCLK_1	12	P		
VDD_BANK0	VDDCLK_0	22	P		
VDD_DIG	VDDDIG	26	P		
VDDA	VDDA	18	P		
Miscellaneous					
vPWRGD/PWRDN#	PWRGD_PWRDNb	1	I	RC19204 has an internal pullup resistor while LMKDB1204 has an internal pulldown resistor. TI followed DB2000QL's definition as a guideline which states that the PWRGD/PWRDN# pin needs to have an internal pulldown resistor.	Do not leave this pin floating and depend on the internal resistor. Drive pin low or high through external controllers, or pull pin low or high through external resistors.

PIN				Pin Differences between RC19204 and LMKDB1204 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19204 with the LMKDB1204
TI NAME	RENESAS NAME	NO.	TYPE		
^vCLKIN_SEL_tri/ SMB_DATA	CLKSEL_tri	8	I	**Completing a drop-in replacement does not require any changes on these pins.** This pin is the CLKIN_SEL_tri for both the RC19204 and the LMKDB1204. The LMKDB1204 offers an additional SMBus functionality. When SMBus is enabled, this pin serves as the SMBus data.	N/A.
vSMB_EN	DNC	15	I	**Completing a drop-in replacement does not require any changes on these pins.** These pins are NC for both the RC19204 and the LMKDB1204 and can be left floating. LMKDB1204 offers an additional SMBus functionality. This pin has an internal pulldown resistor that disables SMBus by default.	N/A.
LOS#	LOSb	17	O	No difference	
GND	GNDSUB	27	G		
vZOUT_SEL	ZOUTSEL	28	I		
GND	EPAD	DAP/29	G		

8.2 RC19204 vs. LMKDB1204 Exposed Register Comparison

No comparison can be completed between the RC19204 vs. the LMKDB1204 because Renesas does not expose any registers for the RC19204.

9 RC19202 vs. LMKDB1202 Comparison

9.1 RC19202 vs. LMKDB1202 Pin Comparison

To summarize, OE1# pin (15) needs to receive a certain slew rate to certify the part behaves as expected (≥ 0.1V/ns). To do that, pin 15 cannot see a resistance higher than 1kΩ. Make sure the internal resistance of the component driving the LMKDB1202 and any other series resistance on pin 15 are below 1kΩ.

PIN				Pin Differences between RC19202 and LMKDB1202 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19202 with the LMKDB1202
TI NAME	RENESAS NAME	NO.	TYPE		
Input					
CLKIN0_P	CLKIN0	1	I	No difference	N/A.
CLKIN0_N	CLKINb0	2	I		
CLKIN1_P	CLKIN1	4	I		
CLKIN1_N	CLKINb1	5	I		
Output and Output Enable					
CLK2_P	CLK10	9	O	No difference	N/A.
CLK2_N	CLKb10	10	O		
CLK1_P	CLK5	16	O		
CLK1_N	CLKb5	17	O		
^OE2#	OEb_F	12	I		
^OE1#	OEb_C	15	I	This pin needs to receive a certain slew rate (≥ 0.1V/ns) to certify the LMKDB1202 behaves as expected. To do that, this pin cannot see a resistance higher than 1kΩ. Renesas does not mention this pin having this requirement in the RC19202 data sheet, so TI assumed this as a difference between the RC19202 and the LMKDB1202.	Make sure the internal resistance of the component driving the LMKDB1202 and any other series resistance on this pin are ≤ 1kΩ. In most applications, slew rate requirements are generally met and this is not an issue.
Power					
VDD_IN0	VDDIN0	3	P	No difference	**No changes are required.** Keep the same power filtering used for the RC19202.
VDD_IN1	VDDINI1	6	P		
VDD_BANK1	VDDCLK_1	8	P		
VDD_DIG	VDDDIG	19	P		
VDD_BANK0	VDDCLK_0	18	P		
VDDA	VDDA	14	P		
Miscellaneous					
^vCLKIN_SEL_tri	CLKSEL_tri	7	I	No difference	N/A.
vZOUT_SEL	ZOUTSEL	11	I		
LOS#	LOSb	13	O		
GND	GNDSUB	20	G		
GND	EPAD	DAP/21	G		

9.2 RC19202 vs. LMKDB1202 Exposed Registers Comparison

No comparison can be completed between the RC19202 vs. the LMKDB1202 because neither Renesas nor TI expose any registers.

10 RC19002 vs. LMKDB1102 Comparison

10.1 RC19002 vs. LMKDB1102 Pin Comparison

To summarize, when replacing the RC19002 with the LMKDB1102:

- OE1# pin (15) needs to receive a certain slew rate to certify the part behaves as expected (≥ 0.1V/ns). To do that, pin 15 cannot see a resistance higher than 1kΩ. Make sure the internal resistance of the component driving the LMKDB1102 and any other series resistance are below 1kΩ.
- Do not leave pin 7 (GND) floating. Tie this pin to GND.

PIN				Pin Differences between RC19002 and LMKDB1102 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19002 with the LMKDB1102
TI NAME	RENESAS NAME	NO.	TYPE		
Input					
CLKIN_P	CLKIN0	1	I	No difference	N/A
CLKIN_N	CLKINb0	2	I		
Output and Output Enable					
CLK2_P	CLK10	9	O	No difference	N/A
CLK2_N	CLKb10	10	O		
CLK1_P	CLK5	16	O		
CLK1_N	CLKb5	17	O		
^OE2#	OEb10	12	I		
^OE1#	OEb5	15	I	This pin needs to receive a certain slew rate to certify the part behaves as expected (≥ 0.1V/ns). To do that, this pin cannot see a resistance higher than 1kΩ. Renesas does not mention this pin having this requirement in the RC19002 data sheet, so TI assumed this as a difference between the RC19002 and the LMKDB1102.	Make sure the internal resistance of the component driving the LMKDB1102 and any other series resistance on this pin are ≤ 1kΩ. In most applications, slew rate requirements are generally met and this is not an issue.
Power					
VDDA	VDDCLK/DNC	6	P	**Completing a drop-in replacement does not require any changes on this pin.** The RC19002 pin is both a NC pin and a power supply pin while the LMKDB1102 pin is only a power supply pin. TI recommends to connect this pin to VDD. This recommendation can be disregarded for drop-in replacements.	**No changes are required.** Keep the same power filtering used for the RC19002.
VDD	VDDCLK	3	P	No difference	
VDD	VDDCLK	8	P		
VDD	VDDCLK	14	P		
VDD	VDDCLK	18	P		
VDD	VDDDIG	19	P		
Miscellaneous					
NC	NC	4	I	No difference	N/A.
NC	NC	5	I		

PIN				Pin Differences between RC19002 and LMKDB1102 that Affect Drop-In Replacements	Design Requirements when Replacing the RC19002 with the LMKDB1102
TI NAME	RENESAS NAME	NO.	TYPE		
GND	GND/DNC	7	I or G	This pin on the RC19002 is both a NC pin and a GND pin so the pin can either be left floating or connected to GND while this pin on the LMKDB1102 is only a GND pin. TI is unable to tie this pin to DAP/GND inside the package without causing any reliability concerns.	Do not leave this pin floating. Tie this pin to GND.
vZOUT_SEL	ZOUTSEL	11	I	No difference	N/A.
LOS#	LOSb	13	O		
GND	GNDSUB	20	G		
GND	EPAD	DAP/21	G		

10.2 RC19002 vs. LMKDB1102 Exposed Registers Comparison

No comparison can be completed between the RC19002 vs. the LMKDB1102 because neither Renesas nor TI expose any registers.

11 Summary

The RC19xxx/9QXL2001x device families and the LMKDB1xxx/CDCDB2000 device families have the same pin-outs for each respective comparison. However, there are a few design differences for certain pins between the compatible parts that require changes to complete a drop-in replacement to not affect proper operation. The specific requirements and differences are highlighted in this document.

12 References

- Texas Instruments, *LMKDB1xxx PCIe Gen 1 to Gen 6 Ultra Low Jitter 1:20, 1:8, 1:4, 1:2, 2:4, 2:2 LP-HCSL Clock Buffer and Clock MUX*, data sheet.
- Renesas, *RC190xx*, data sheet.
- Renesas, *RC192xx*, data sheet.

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