

## A. ECAD Design Information

This appendix contains information that supports the development of the PCB ECAD model for this device. It is intended to be used by PCB designers.

### A.1 Part Number Indexing

Orderable Part Number	Number of Pins	Package Type	Package Code/POD Number
R5F21244SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21244SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21244SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21244SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21245SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21245SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21245SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21245SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21246SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21246SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21246SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21246SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21247SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21247SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21247SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21247SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21248SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21248SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21248SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21248SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21254SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21254SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21254SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21254SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21255SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21255SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21255SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21255SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21256SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21256SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21256SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21256SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21257SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21257SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21257SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21257SNFP#X6	52	LQFP	PLQP0052JA-A
R5F21258SDFP#V2	52	LQFP	PLQP0052JA-A
R5F21258SDFP#X6	52	LQFP	PLQP0052JA-A
R5F21258SNFP#V2	52	LQFP	PLQP0052JA-A
R5F21258SNFP#X6	52	LQFP	PLQP0052JA-A

### A.2 Symbol Pin Information

#### A.2.1 52-LQFP

Pin Number	Primary Pin Name	Primary Electrical Type	Alternate Pin Name(s)
1	NC	Passive	-
2	SCL	I/O	P3_5/SSCK
3	P3_3	I/O	SSI
4	\SDA	I/O	P3_4/SCS#
5	MODE	Input	-

Pin Number	Primary Pin Name	Primary Electrical Type	Alternate Pin Name(s)
6	XCIN	Input	P4_3
7	XCOU	Output	P4_4
8	\RESET	Input	-
9	XOUT	Output	P4_7
10	VSS	Power	AVSS
11	XIN	Input	P4_6
12	VCC	Power	AVCC
13	P2_7	I/O	TRDIOD1
14	P2_6	I/O	TRDIOC1
15	P2_5	I/O	TRDIOB1
16	P2_4	I/O	TRDIOA1
17	P2_3	I/O	TRDIOD0
18	P2_2	I/O	TRDIOC0
19	P2_1	I/O	TRDIOB0
20	P2_0	I/O	TRDIOA0/TRDCLK
21	P1_7	I/O	INT1#/TRAIO
22	P1_6	I/O	CLK0
23	P1_5	I/O	(INT1#)/(TRAIO)/RXD0
24	P1_4	I/O	TXD0
25	P1_3	I/O	KI3#/AN11
26	NC	Passive	-
27	P4_5	I/O	INT0#/INTO#
28	P6_6	I/O	INT2#/TXD1
29	P6_7	I/O	INT3#/RXD1
30	P1_2	I/O	KI2#/AN10
31	P1_1	I/O	KI1#/AN9
32	P1_0	I/O	KI0#/AN8
33	P3_1	I/O	TRBO
34	P3_0	I/O	TRA0
35	P6_5	I/O	CLK1
36	P6_4	I/O	-
37	P6_3	I/O	-
38	P0_7	I/O	AN0
39	NC	Passive	-
40	NC	Passive	-
41	P0_6	I/O	AN1
42	P0_5	I/O	AN2
43	P0_4	I/O	AN3
44	P4_2	Input	VREF
45	P6_0	I/O	TRE0
46	P6_2	I/O	-
47	P6_1	I/O	-
48	P0_3	I/O	AN4
49	P0_2	I/O	AN5
50	P0_1	I/O	AN6
51	P0_0	I/O	AN7
52	P3_7	I/O	SS0

### A.3 Symbol Parameters

Orderable Part Number	Min Input Voltage	Max Input Voltage	Max Output Frequency	Min Operating Temperature	Max Operating Temperature	RAM Size	Memory Size	Interface	Number of ADC Channels	Number of I2C Channels	Number of SPI Channels	Number of UART Channels	Number of Timers/Counters
R5F21244SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21244SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21244SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21244SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21245SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21245SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21245SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21245SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21246SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21246SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21246SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21246SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21247SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21247SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21247SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21247SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21248SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch

Orderable Part Number	Min Input Voltage	Max Input Voltage	Max Output Frequency	Min Operating Temperature	Max Operating Temperature	RAM Size	Memory Size	Interface	Number of ADC Channels	Number of I2C Channels	Number of SPI Channels	Number of UART Channels	Number of Timers/Counters
R5F21248SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21248SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21248SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21254SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21254SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21254SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21254SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1 KB	16 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21255SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21255SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21255SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21255SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	1.5 KB	24 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21256SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21256SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21256SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21256SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2 KB	32 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21257SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21257SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21257SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21257SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	2.5 KB	48 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch

Orderable Part Number	Min Input Voltage	Max Input Voltage	Max Output Frequency	Min Operating Temperature	Max Operating Temperature	RAM Size	Memory Size	Interface	Number of ADC Channels	Number of I2C Channels	Number of SPI Channels	Number of UART Channels	Number of Timers/Counters
R5F21258SDF P#V2	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21258SDF P#X6	2.2 V	5.5 V	20 MHz	-40 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21258SNF P#V2	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch
R5F21258SNF P#X6	2.2 V	5.5 V	20 MHz	-20 °C	+85 °C	3 KB	64 KB	UART, I2C, LIN	10-bit X 12-Ch	1	0	2	8-bit X 3-Ch, 16-bit X 2-Ch

## A.4 Footprint Design Information

### A.4.1 52-LQFP

IPC Footprint Type	Package Code/ POD number	Number of Pins
QFP	PLQP0052JA-A	52

Description	Dimension	Value (mm)	Diagram
Minimum lead span (vertical side)	Dmin	11.8	
Maximum lead span (vertical side)	Dmax	12.2	
Minimum lead span (horizontal side)	Emin	11.8	
Maximum lead span (horizontal side)	Emax	12.2	
Minimum body span (vertical side)	D1min	9.9	
Maximum body span (vertical side)	D1max	10.1	
Minimum body span (horizontal side)	E1min	9.9	
Maximum body span (horizontal side)	E1max	10.1	
Minimum Lead Width	Bmin	0.27	
Maximum Lead Width	Bmax	0.37	
Minimum Lead Length	Lmin	0.35	
Maximum Lead Length	Lmax	0.65	
Maximum Height	Amax	1.7	
Minimum Standoff Height	A1min	0.05	
Minimum Lead Thickness	cmin	-	
Maximum Lead Thickness	cmax	-	
Number of pins (vertical side)	PinCountD	13	
Number of pins (horizontal side)	PinCountE	13	
Distance between the center of any two adjacent pins	Pitch	0.65	
Location of pin 1; S2 = corner of D side, C1 = center of E side	Pin1	S2	
Minimum thermal pad size (vertical side)	D2min	-	
Maximum thermal pad size (vertical side)	D2max	-	
Minimum thermal pad size (horizontal side)	E2min	-	
Maximum thermal pad size (horizontal side)	E2max	-	

Recommended Land Pattern (NSMD Design)			
Description	Dimension	Value (mm)	Diagram
Distance between left pad toe to right pad toe (horizontal side)	ZE	-	
Distance between top pad toe to bottom pad toe (vertical side)	ZD	-	
Distance between left pad heel to right pad heel (horizontal side)	GE	-	
Distance between top pad heel to bottom pad heel (vertical side)	GD	-	
Pad Width	X	-	
Pad Length	Y	-	