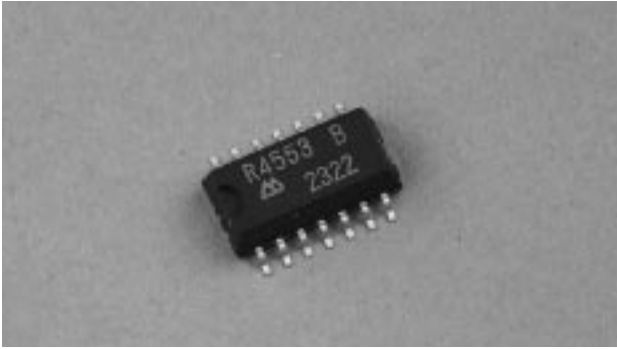


Real Time Clock Modules - Seiko Epson

Serial Interface RTC4553



Specifications

Absolute Maximum Rating

Item	Symbol	Condition	MIN	MAX	Unit
Supply voltage	V_{DD}	V_{DD} -GND	-0.3	+6.0	
Input voltage	V_{IN}	S_{IN} , SCK, WR, CS_0 , CS_1	-0.3	$V_{DD}+0.3$	V
Output voltage	V_{OUT}	S_{OUT} , T_{POUT}	-0.3	$V_{DD}+0.3$	V
Storage temperature	T_{STG}	Stored without Tape & Reel	-55	+125	°C
Soldering conditions	T_{SOL}		Under 260°C within 10 sec. x up to 2 times or under 230°C within 3 min.		

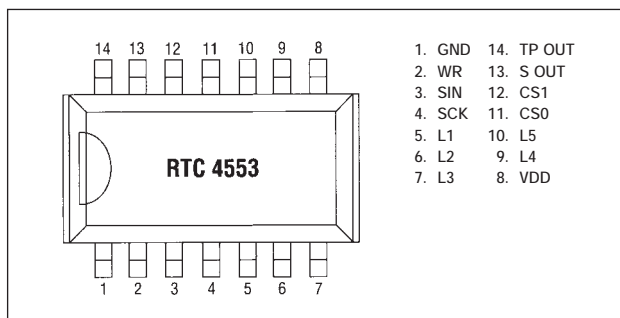
Operating Range

Item	Symbol	Condition	MIN	TYP.	MAX.	Unit
Operating voltage	V_{DD}		2.7	5.0	5.5	V
Operating temperature	T_{OPR}		-30		+70	°C

Frequency Characteristics

Item	Symbol	Condition	Range	Unit	
Frequency tolerance	$\Delta f/fo$	$T_a=25^\circ\text{C}$, $V_{DD}=5\text{V}$	AA	5.0±5.0	ppm
			A	5.0±10.0	ppm
			B	5.0±20.0	ppm
Frequency temperature characteristics	top	$T_a=-10$ to $+70^\circ\text{C}$, $V_{DD}=5\text{V}$	-10.0	ppm	
Frequency voltage characteristics	f/V	Reference at 25°C $T_a=\text{Fix}$, $V_{DD}=2$ to 5.5V Reference at 5V	+120.0	ppm	
Aging	fa	$T_a=25^\circ\text{C}$, $V_{DD}=5\text{V}$ first year	±5	ppm/year	

Pin Connections



Features

- Streamlined and adjustment free
- Small package makes high density mounting possible
- Automatic calendar function (year, month, day, day of week, hour minute, second)
- Built in 30 x 4 bit S-RAM
- High speed access
- Reference pulse output (1024Hz, 10Hz)
- Low current consumption due to C-MOS IC (1µA typical)

DC Characteristics

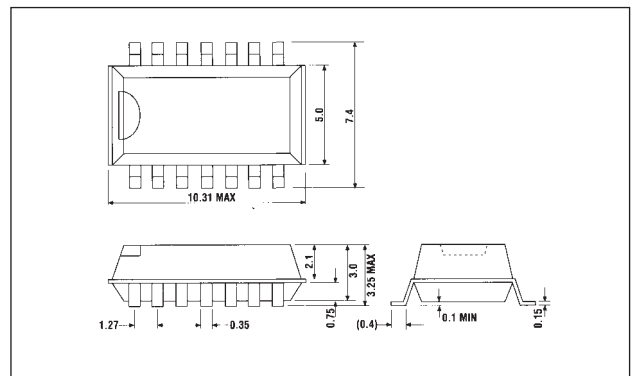
•VDD5V±10% (GND=0V, $T_a=30^\circ\text{C} +70^\circ\text{C}$)

Item	Symbol	Condition	Min	Top	Max	Unit
Data holding	V_{DH}	-	2.0	5.5		V
Current consumption	I_{DD1}	SCK=500kHz		100		µA
	I_{DD2}	SCK=DC		1.0	3.0	
Output voltage	V_{OH}	$I_{OH}=-400\mu\text{A}$	$V_{DD}-0.4$			V
	V_{OL}	$I_{OL}=1.6\text{mA}$		0.4		
Off leak current	I_{OZH}	$V_{OUT}=5.5\text{V}$	-2.0	2.0		V
	I_{OZL}	$V_{OUT}=0\text{V}$	-2.0	2.0		
Input voltage	V_{IH}		$4/5 V_{DD}$			V
	V_{IL}			$1/5 V_{DD}$		
Input current	I_{IH}	$V_{IN}=5.5\text{V}$	-2.0	2.0		µA
	I_{IL}	$I_{IL} V_{IN}=0\text{V}$	-2.0	2.0		
Oscillation startup time	T_S	$T_a=25^\circ\text{C}$		3.0		S

•VDD3V±10% (GND=0V, $T_a=30^\circ\text{C} +70^\circ\text{C}$)

Item	Symbol	Condition	Min	Top	Max	Unit
Data holding	V_{DH}		2.0	3.3		V
Current consumption	I_{DD1}	SCK=300kHz		100		µA
	I_{DD2}	SCK=DC		1.0	3.0	
Output voltage	V_{OH}	$I_{OH}=-400\mu\text{A}$	$V_{DD}-0.4$			V
	V_{OL}	$I_{OL}=1.6\text{mA}$		0.4		
Off leak current	I_{OZH}	$V_{OUT}=3.3\text{V}$	-2.0	2.0		µA
	I_{OZL}	$V_{OUT}=0\text{V}$	-2.0	2.0		
Input voltage	V_{IH}		$4/5 V_{DD}$			V
	V_{IL}			$1/5 V_{DD}$		
Input current	I_{IH}	$V_{IN}=3.3\text{V}$	-2.0	2.0		µA
	I_{IL}	$V_{IN}=0\text{V}^*$	-2.0	2.0		
Oscillation startup time	T_S	$T_a=25^\circ\text{C}$		3.0		S

Dimensions (mm)



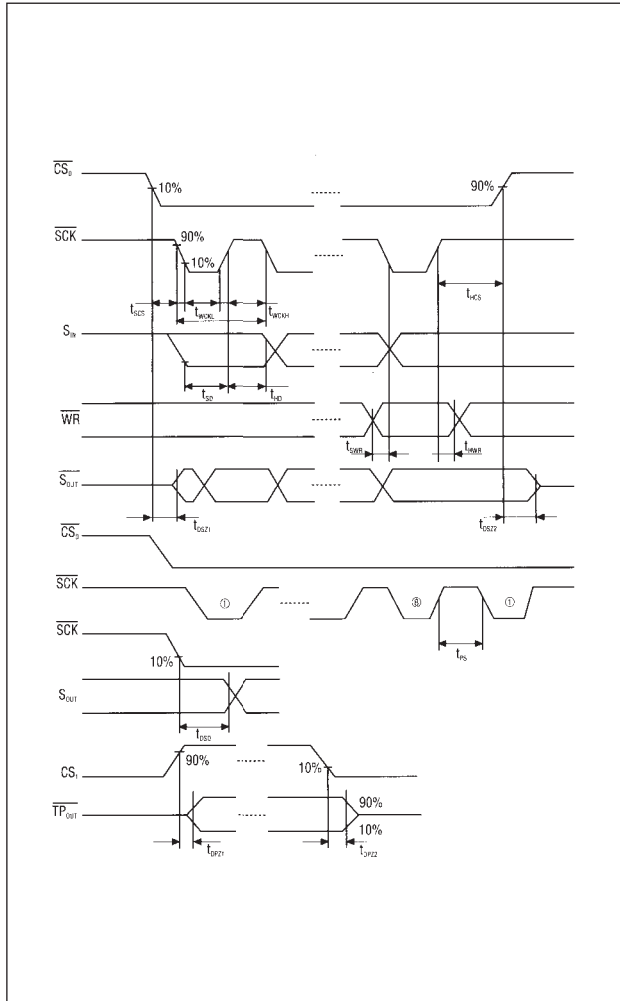
Real Time Clock Modules - Seiko Epson

Serial Interface RTC-4553 Continued

Register Table

Address					MODE 0					MODE 1				MODE 2				
					Register symbol	Counter control register				User RAM Domain 1				User RAM Domain 2				
A ₃	A ₂	A ₁	A ₀		D ₃	D ₂	D ₁	D ₀	register name	D ₃	D ₂	D ₁	D ₀	D ₃	D ₂	D ₁	D ₀	
0	0	0	0	0	S ₁	S ₈	S ₄	S ₂	S ₁	1-second digit register	RA ₃	RA ₂	RA ₁	RA ₀	RA ₆₃	RA ₆₂	RA ₆₁	RA ₆₀
1	0	0	0	1	S ₁₀	0	S ₄₀	S ₂₀	S ₁₀	10-seconds digit register	RA ₇	RA ₆	RA ₅	RA ₄	RA ₆₇	RA ₆₆	RA ₆₅	RA ₆₄
2	0	0	1	0	M ₁	m ₈	m ₄	m ₂	m ₁	1-minute digit register	RA ₁₁	RA ₁₀	RA ₉	RA ₈	RA ₇₁	RA ₇₀	RA ₆₉	RA ₆₈
3	0	0	1	1	M ₁₀	0	m ₄₀	m ₂₀	m ₁₀	10-minutes digit register	RA ₁₅	RA ₁₄	RA ₁₃	RA ₁₂	RA ₇₅	RA ₇₄	RA ₇₃	RA ₇₂
4	0	1	0	0	H ₁	h ₈	h ₄	h ₂	h ₁	1-hour digit register	RA ₁₉	RA ₁₈	RA ₁₇	RA ₁₆	RA ₇₉	RA ₇₈	RA ₇₇	RA ₇₆
5	0	1	0	1	H ₁₀	PM/AM	0	h ₂₀	h ₁₀	10-hours digit register	RA ₂₃	RA ₂₂	RA ₂₁	RA ₂₀	RA ₈₃	RA ₈₂	RA ₈₁	RA ₈₀
6	0	1	1	0	W	0	w ₄	w ₂	w ₁	Day of the week digit register	RA ₂₇	RA ₂₆	RA ₂₅	RA ₂₄	RA ₈₇	RA ₈₆	RA ₈₅	RA ₈₄
7	0	1	1	1	D ₁	d ₈	d ₄	d ₂	d ₁	1-day digit register	RA ₃₁	RA ₃₀	RA ₂₉	RA ₂₈	RA ₉₁	RA ₉₀	RA ₈₉	RA ₈₈
8	1	0	0	0	D ₁₀	0	0	d ₂₀	d ₁₀	10-days digit register	RA ₃₅	RA ₃₄	RA ₃₃	RA ₃₂	RA ₉₅	RA ₉₄	RA ₉₃	RA ₉₂
9	1	0	0	1	MO ₁	m ₀₈	m ₀₄	m ₀₂	m ₀₁	1-month digit register	RA ₃₉	RA ₃₈	RA ₃₇	RA ₃₆	RA ₉₉	RA ₉₈	RA ₉₇	RA ₉₆
A	1	0	1	0	MO ₁₀	0	0	0	m ₀₁	10-months digit register	RA ₄₃	RA ₄₂	RA ₄₁	RA ₄₀	RA ₁₀₃	RA ₁₀₂	RA ₁₀₁	RA ₁₀₀
B	1	0	1	1	Y ₁	y ₈	y ₄	y ₂	y ₁	1-year digit register	RA ₄₇	RA ₄₆	RA ₄₅	RA ₄₄	RA ₁₀₇	RA ₁₀₆	RA ₁₀₅	RA ₁₀₄
C	1	1	0	0	Y ₁₀	y ₈₀	y ₄₀	y ₂₀	y ₁₀	10-years digit register	RA ₅₁	RA ₅₀	RA ₄₉	RA ₄₈	RA ₁₁₁	RA ₁₁₀	RA ₁₀₉	RA ₁₀₈
D	1	1	0	1	C ₁	TPS	30ADJ	CNTR	24/12	Control register 1	RA ₅₅	RA ₅₄	RA ₅₃	RA ₅₂	RA ₁₁₅	RA ₁₁₄	RA ₁₁₃	RA ₁₁₂
E	1	1	1	0	C ₂	BUSY	PONC		*	Control register 2	RA ₅₉	RA ₅₈	RA ₅₇	RA ₅₆	RA ₁₁₉	RA ₁₁₈	RA ₁₁₇	RA ₁₁₆
F	1	1	1	1	C ₃	SVSR	TEST	MS ₁	MS ₀	Control register 3	Same as mode 0				Same as mode 0			

Timing Chart



Switching Characteristics

VDD=5V ±10%, GND=0V, Ta=-30 to 70°C)

Item	Symbol	Condition	Min	Typ	Max	Unit
SCK input frequency	fSCK				500	kHz
SCK "L" time	t_{WSCKL}		1.0			
SCK "H" time	t_{WSCKH}		1.0			
SCK Pause time	t_{PS}		1.0			
CS ₀ Set up time	t_{SCS}		0			
CS ₀ Hold time	t_{HSC}		0.5			μsec
S _{IN} Data set up time	t_{SD}		0.2			
S _{IN} Data hold time	t_{HD}		0.2			
WR Set up time	t_{SWR}		1.0			
WR Hold time	t_{HWR}		0.5			
S _{OUT} Delay time	t_{DSO}	CL=100pF		150	500	nsec
CS ₀ and CS ₁ Enable to S _{OUT} Output	t_{DSZ1}	CL=100pF			100	
CS ₀ Disable to S _{OUT} High Z	t_{DSZ2}	CL=100pF			100	
CS ₁ Enable to S _{OUT} Output	t_{DPZ1}	CL=100pF			100	
CS ₁ Enable to S _{OUT} High Z	t_{DPZ2}	CL=100pF			100	

Block Diagram

