FCC ID: RE81300249R

Technical Description :

The brief circuit description is listed as follows :
- U1 MF-R1B and associated circuit act as Super-regenerative receiver (49.860 MHz), amplifier and decoder.
- U2 W588S003 and associated circuit act as Micro Controller.
- IR, Q18, Q39 and associated circuit act as IR TX and RX (control for launch the aircraft).
- D1, Q38 and associated circuit act as Voltage Regulator.
- Q1 ~ Q7, Q16 and associated circuit act as Motor driver for Left propeller.
- Q8 ~ Q15 and associated circuit act as Motor driver for Right propeller.
- Q21 ~ Q22, Q32 ~ Q37 and associated circuit act as Motor driver for launch Motor.
- Q19 ~ Q20 and associated circuit act as Motor driver for Helicopter rotate Motor.
- Q23, Q24 and associated circuit act as Motor driver for Motor (Helicopter Return to deck).
- Q25 ~ Q31 and associated circuit act as Motor driver for Motor (Helicopter up & down).

Antenna Used :

An Integral antenna has been used.

General Description

RF Electronics MF-R1B is a fully integrated S-R (Super-regenerative) RF receiver with full-function of baseband control command decoder for application of R/C vehicle, toy, or wireless data communication.

MF-R1B provides both ***uC-mode*** for general purpose micro-controller programming interface and ***manual-mode*** for RF receiver with on-chip 6-function baseband command decoder.

MF-R1B provides ***Smart-Detector*** function which overcomes component deviation, maintain the best receiver sensitivity in mass-production. ***Smart-Detector*** is also capable of adjusting itself to fit various kinds of environmental problems. Some factors like temperature, moisture, or object caused antenna characteristic change could be recovered by the ***Smart-Detector*** function.

The Super-Regenerative RF front-end architecture is convenient for 27MHz ~ 49MHz manufacturing with minimum external components. With wide range of operating voltage 2.1V ~ 5.5V, MF-R1B is suitable for remote controlled toy on 2-battery or 3-battery application.

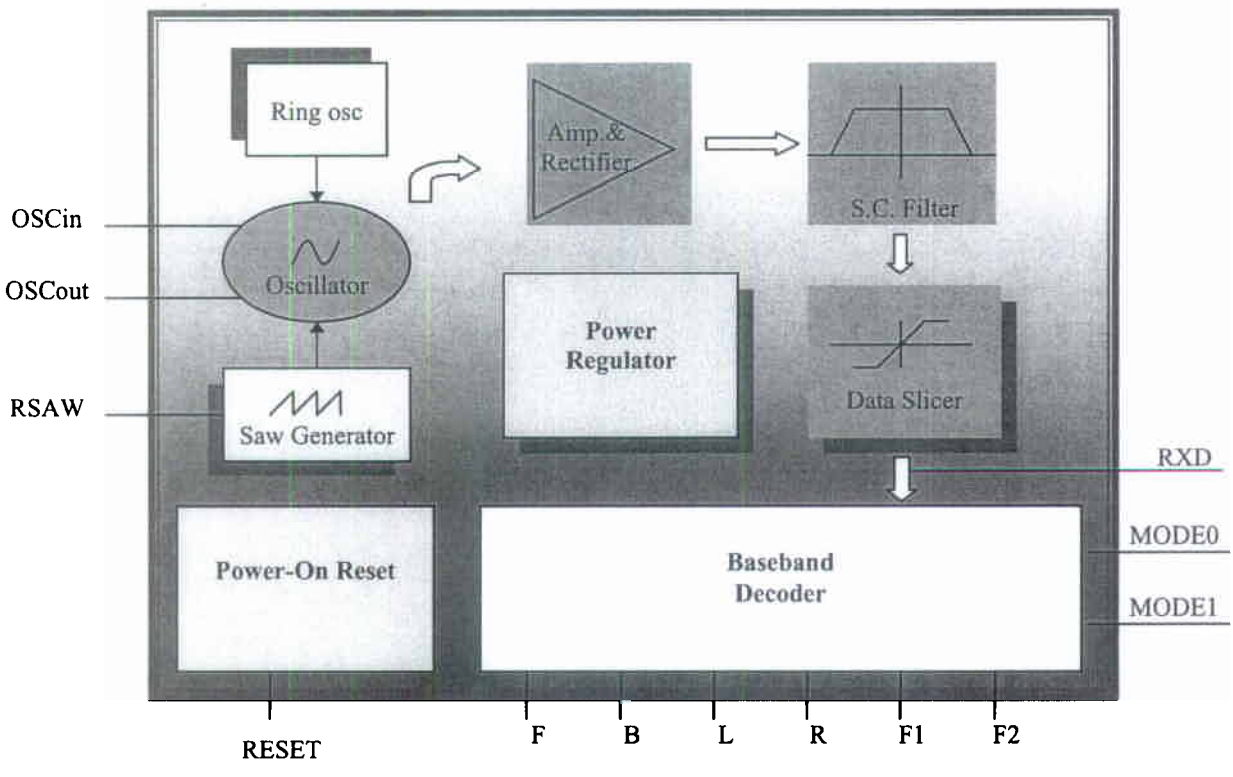
MF-R1B cooperate with MF-T1B is easy and convenient to provide simple remote control function with long control distance and low production cost.

1.1 MF-R1B Features

- Operating frequency: 27MHz,35MHz, 40MHz, 49MHz
- **Smart-Detector** function overcomes the components deviation and environmental problem and maintain best sensitivity in mass-production and operation
- Operating voltage: 2.1V ~ 5.5V
- S-R (Super-regeneration) demodulation scheme
- Receiving data rates up to 1.25Kbps for 50% duty cycle
- ***Manual-mode*** supports 6-function baseband decoder, i,e, Forward, Backward, Left-turn, right-
- turn, and 2 user defined function F1 and F2
- Minimization of current consumption in system
- Very low power down current consumption (***uC-mode*** only)
- Less manual adjustment needed in production
- Fewer external components required in production
- Lower manufacture production cost
- Dice form available for PCB bonding
- Operating temperature: 0°C ~ 70°C

System Description

2.1 MF-R1B System Block Diagram



2.2 MF-R1B Functional Description

Power Regulator
MF-R1B build-in on chip power regulator provides a stable operating performance under operating voltage from 2.1V ~ 5.5V, the very wide range of operating voltage is suitable for mini R/C toy or R/C vehicle application. Especially for 2-battery or 3-battery .

RF Receiver
MF-R1B has been implemented by using "Super-Regenerative" receiving architecture for R/C toy application. The high noise immunity structure is very suitable for getting higher RF receiving performance in very high noise level environment. The **Smart-Detector** function overcomes component deviation and various environmental problems, maintain the best receiver sensitivity in mass-production and operation.

Baseband Control Function Decoder
MF-R1B build-in 6-function of general R/C toy baseband control function for R/C toy "**F**orward"; "**B**ackward"; "**L**eft-turn"; "**R**ight-turn", and 2 more reserved control functions of "**F1**"; "**F2**".

Electronic Characteristics

3.1 MF-R1B Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage to Ground Potential	- 0.3 to 6.5	V
Applied Input/Output Voltage	- 0.3 to 6.5	V
Power Dissipation (T_a = 70°C)	150	mW
Ambient Operating Temperature	0 to 70	°C
Storage Temperature	-40 to 85	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.

1. GENERAL DESCRIPTION

The W588Sxxx is a powerful microcontroller-based speech synthesizer with 3 channels of speech and melody for multi-tasking applications.

The W588Sxxx provides slow mode operation and PWM output to help reduce the power consumption for longer battery life. Also, the W588Sxxx adopts the MDPCM, ADPCM or PCM algorithm to reproduce high quality sound outputs.

Other powerful functions like IR carrier generation and event synchronization mechanism are provided to meet the requirements for more complicated multi-tasking applications.

The W588Sxxx family contains several items with different playback duration as shown below: (@5-bit MDPCM algorithm, 6KHz sampling rate)

ITEM	**W588S003**	**W588S006**	**W588S010**	**W588S013**	**W588S016**
*Duration	4 sec.	7 sec.	12 sec.	16 sec.	20 sec.
ITEM	**W588S020**	**W588S025**	**W588S030**	**W588S040**	**W588S050**
Duration	25 sec.	29 sec.	32 sec.	50 sec.	58 sec.
ITEM	**W588S060**	**W588S080**	**W588S100**	**W588S120**	-
Duration	66 sec.	100 sec.	118 sec.	133 sec.	-

**ITEM	**W588S009**	**W588S012**	**W588S015**
Duration	12 sec.	16 sec.	20 sec.

Note:

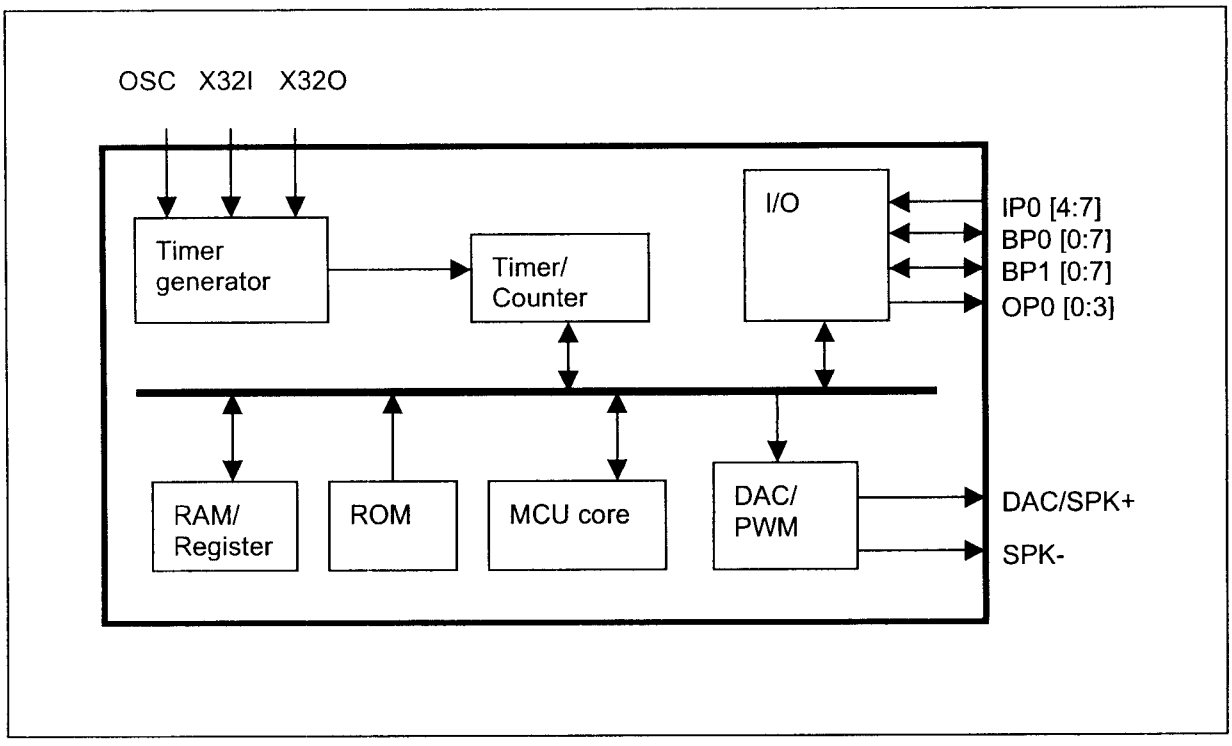
*: The duration time is based on 5-bit MDPCM at 6KHz sampling rate. The firmware library and program code have been excluded from user's ROM space for the duration estimation.

**: W588S009, S012 and S015 are a little different in RAM and I/O definition. Meanwhile, PowerScriptTM dose not support either.

2. FEATURE

- Wide Operating voltage: 2.4 ~ 5.5 volt
- Build in 8-bit MCU core with powerful programmable capability
- System clock
  - 4 MHz at 2.4 ~ 5.5 volt
  - 8 MHz at 3.6 ~ 5.5 volt
- F/W speech synthesis
  - 5-bit MDPCM, 4-bit ADPCM or 8-bit PCM algorithm can be used
  - Programmable sample rate
- Direct-drive PWM output to save power consumption (no support in W588S003 and W588S006)
- Built-in 3 timers for speech/melody synthesis and general purpose applications
  - 2 speech channels
  - 1 speech channel plus dual-tone melody
  - 2 voice melody channels
- Build in on-chip mixer
- Built-in 32 KHz crystal oscillator with divider for time-keeping application
- Provide Watch Dog Timer (WDT)
- Provide power management to save current consumption:
  - 4 ~ 8 MHz system clock, with Ring type oscillator
  - Slow mode to reduce power
  - Stop mode for stopping all IC operations
- I/O configuration
  - W588S003 ~ W588S120: 16 I/O
  - W588S009, W588S012, W588S015: 4 In, 8 I/O, 4 Out
- Shared ROM for voice, melody and program storage
- Provide IR carrier generation
- Built-in Serial Interface Manager (SIM) in W588S080 ~ W588S120
- Support ***PowerScript***^{TM} for developing codes in easy way. (No support in W588S009, S012, and S015)
- Full-fledged development system
  - Source-level ICE debugger (Assembly & ***PowerScript***^{TM} format)
  - Event synchronization mechanism
  - Compatible with W566B/C & W567S system
  - User-friendly GUI environment
- Available package form:
  - COB is essential
  - W588S003 ~ W588S120: LQFP48
  - W588S009, S012, S015: QFP44

4. BLOCK DIAGRAM



Notes:

1. IP0 and OP0 are only providing in W588S009, W588S012 and W588S015.
2. BP1 is no providing in W588S009, W588S012 and W588S015.
3. PWM is no providing in W588S003 and W588S006.

5. ELECTRICAL CHARACTERISTICS

5.1 Absolute maximum ratings

PARAMETER	SYMBOL	CONDITIONS	RATED VALUE	UNIT
Power Supply	V_{DD}-V_{SS}	-	-0.3 to +7.0	V
Input Voltage	V_{IN}	All Inputs	V_{SS} -0.3 to V_{DD} +0.3	V
Storage Temp.	T_{STG}	-	-55 to +150	°C
Operating Temp.	T_{OPR}	-	0 to +70	°C

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device.