

Description

The RT1221/RT1222 are remote control transmitter utilizing CMOS technology specially designed for infrared remote control applications. Maximum of 65536 customer codes are available by setting external diodes, resistors and internal MASK ROM. Using micro-Processors for decoder can construct various powerful applications for remote control systems.

Features

CMOS technology

Operating voltage: 1.8~3.5V

Low power consumption

455KHz ceramic resonator or crystal

Dout with 38KHz carrier for IR medium

65536 customer codes can be selected

Maximum active keys:

RT1221:32 function keys and 3 double action keys

RT1222:64 function keys and 3 double action keys

Transmission code consists of: 1 leader-pulse, 16-bit customer code and 16-bit data code

Applications

Stereo equipment

Television(TV)

Video cassette recorder(VCR)

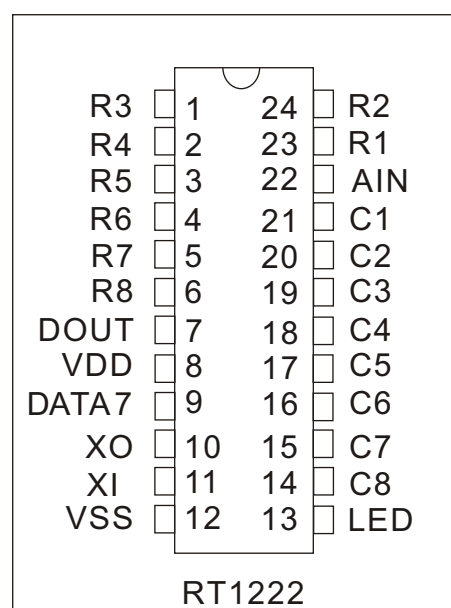
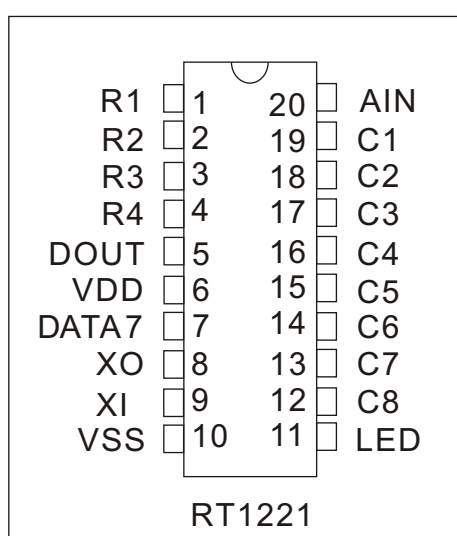
Video compact disk(VCD)

Digital video disk(DVD)

Multi-media system

Cable TV tuner

Pin Configuration



Pin Description

Pin Name	Pin No		I / O	Description
	RT1221	RT1222		
R1,R2	1, 2	23,24	I	Row control for keyboard matrix
R3,R4	3, 4	1, 2	I	
R5~R8	-	3~ 6	I	
DOUT	5	7	O	Serial data output, with a 38KHz carrier
VDD	6	8		Positive power supply
DATA7	7	9	I	Most significant data bit code setting
XO	8	10	O	455KHz ceramic resonator output
XI	9	11	I	455KHz ceramic resonator input
VSS	10	12		Negative power supply
LED	11	13	O	Transmission enable indicator output
C8~C1	12~19	14~21	I/O	Column control for keyboard matrix
AIN	20	22	I	Low byte customer code(8-bit) scan input

Maximum Rating

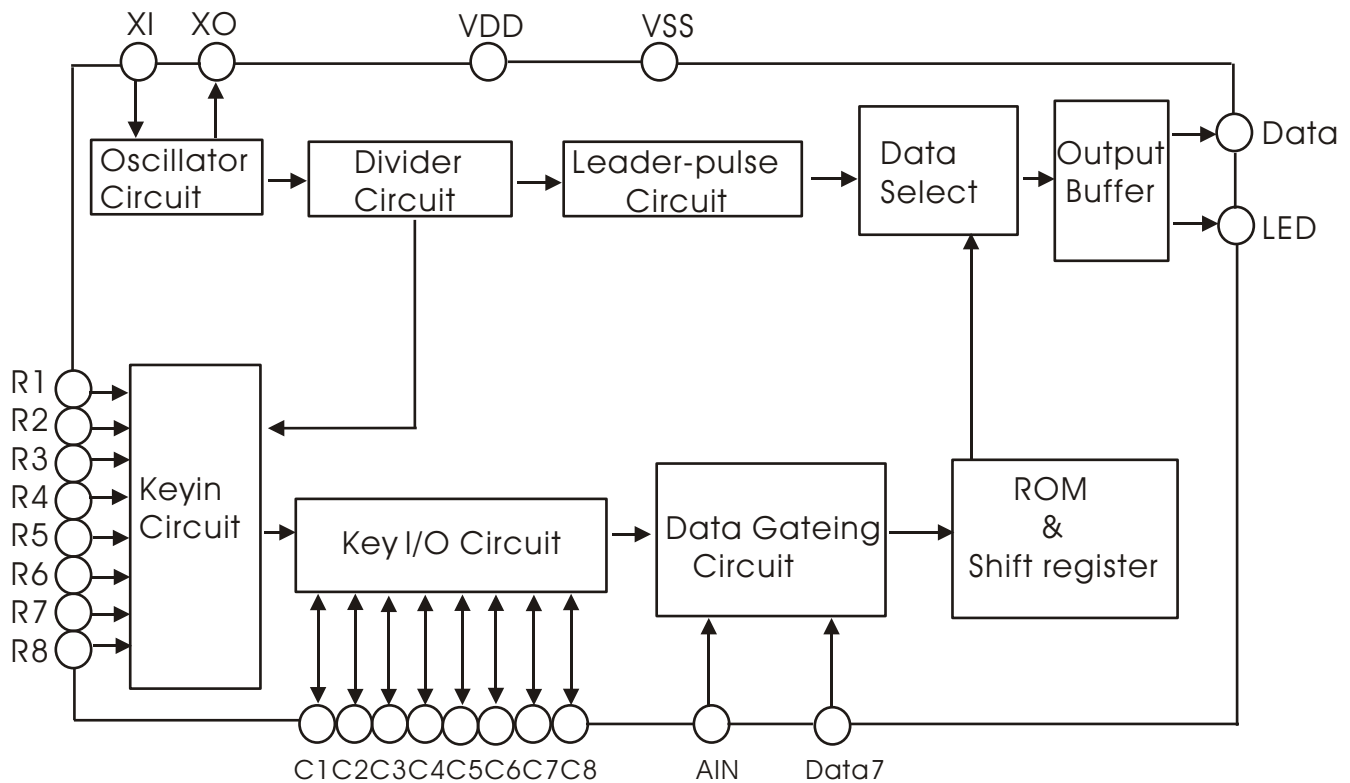
Temp=25°C

Symbol	Characteristic	Rating	Unit
VDD	Supply Voltage	6.0	V
VIN	Input Voltage	-0.3 ~ VDD	V
Pd	Power Dissipation	250	mW
TSTR	Storage Temperature	-40 ~ +125	°C
Top	Operating Temperature	-20 ~ +70	°C

Electrical Characteristic

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Unit
System Frequency	Fosc	-		455K		Hz
Supply Voltage	VDD	-	1.8	3.0	3.5	V
Operating Current	IDD	Fosc=455KHz Without Load	-	200	400	UA
Standby Current	ISTB	Fosc STOP	-	0.1	1	UA
LED Sink Current	IOL(LED)	Vo=0.3V	1.2	2.0	-	mA
LED source Current	IOH(LED)	Vo=2.7V	-10	-60	-	UA
Dout Sink Current	IOL(DOUT)	Vo=0.3V	50	100	-	UA
Dout Source Current	IOH(DOUT)	Vo=2.7V	-2.0	-4.0	-	mA
C1~C8 Sink Current	IOL(Cn)	Vo=0.3V	10	30	-	UA
C1~C8 Source Current	IOH(Cn)	Vo=2.7V	-0.6	-2.0	-	mA
C1~C8 High Level Input Voltage	VIH(Cn)	-	1.1	-	3.0	V
C1~C8 Low Level Input Voltage	VIL(Cn)	-	0	-	0.6	V
R1~R8 High Level Input Voltage	VIH(Rn)	-	1.9	-	3.0	V
R1~R8 Low Level Input Voltage	VIL(Rn)	-	0	-	0.8	V
AIN High Level Input Voltage	VIH(AIN)	-	1.25	-	3.0	V
AIN Low Level Input Voltage	VIL(AIN)	-	0	-	0.6	V
AIN Pull-High Resistance	RPH(Cn)	VIN=0V	100	200	400	KΩ
AIN Pull-Low Resistance	RPL(Cn)	VIN=3V	70	150	250	KΩ
C1~C8 Pull-Low Resistance	RPL(Cn)	VIN=3V	300	500	1500	KΩ
R1~R8 Pull-Low Resistance	RPL(Rn)	VIN=3V	120	200	320	KΩ

Block Diagram:



Function Description:

1. Oscillation circuit:

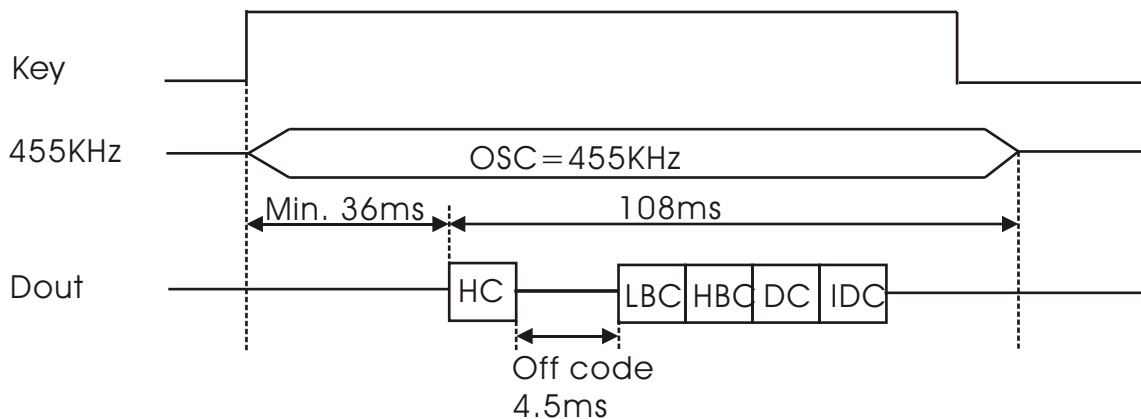
RT1221/RT1222 use 455KHz ceramic resonator or crystal for oscillation.

Oscillation will stop to sleeping mode in order to lower the power consumption when none of the key is being activate.

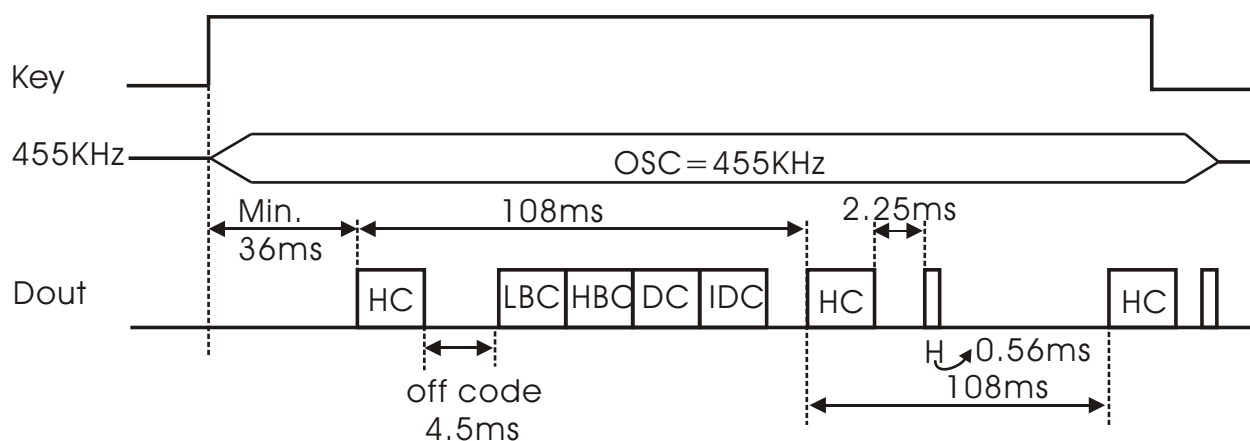
2. Data output format:

A complete transmission of data format consist of 9ms Header Code(HC), 4.5ms off code, 9~18ms 8-Bit low-byte Customer Code(LBC) 、9~18ms 8-Bit High-byte Customer Code(HBC) 、9-18ms 8-Bit Data Code(DC) and 9~18ms 8-Bit Inverse Data Code(IDC).When the key is pressed and held less then 108ms, will transmit 108ms of data format after 36ms.

(a)Key pressed/held less then 108ms:



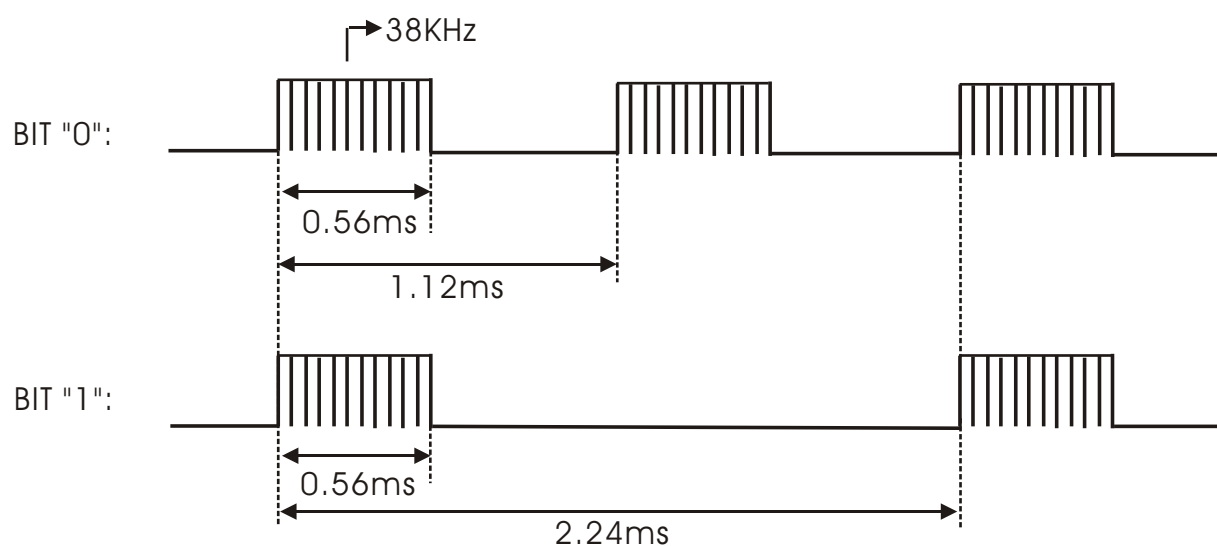
(b) Key pressed / held more than 108ms:



3. Modulation wave:

In order to longer the IR LED life circle and to save the power consumption, We have to cut down the power on timing to the 1/3 duty of 38KHz.

[Waveform):



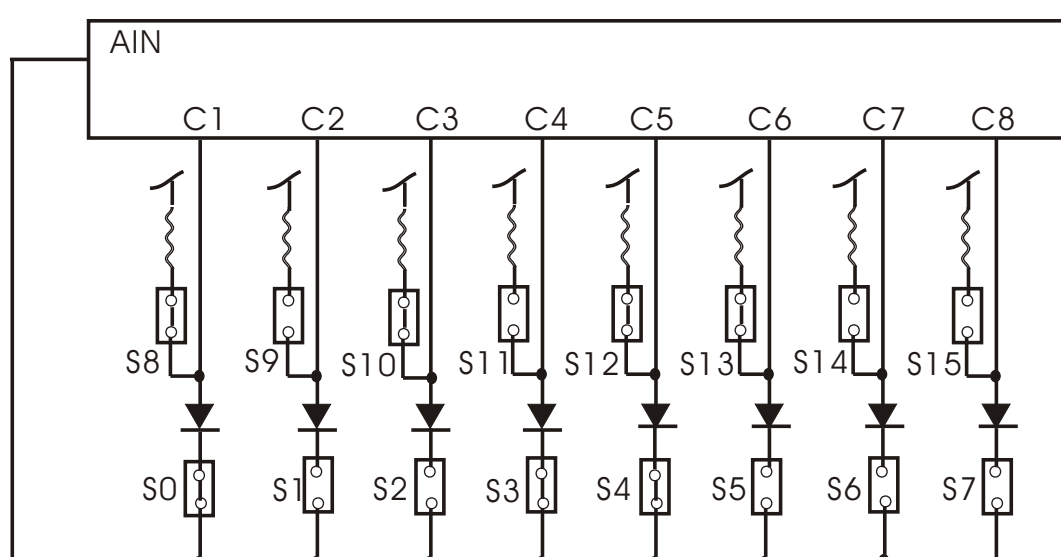
4. Customer code setting:

There are total 16-Bit of customer codes: include 8-Bit of low byte customer Code and 8-Bit of high byte customer code.

(1) RT1221-001/RT1222-001:

The algorithm rule of customer codes can be define by the external diodes, resistors and internal MASK-ROM.

[Example]:

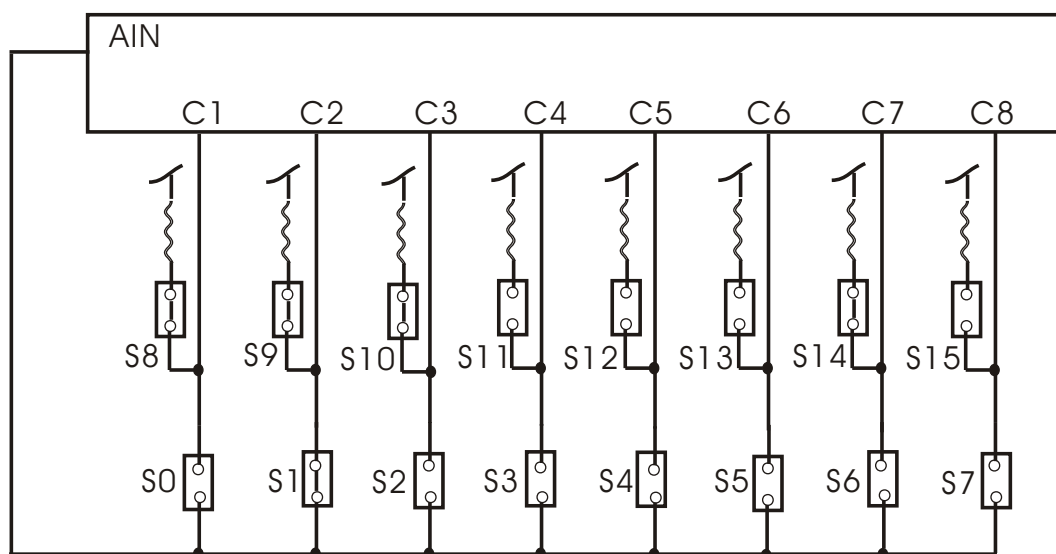


	ROM1	ROM2
	Bit0 Bit7	Bit0 Bit7
Mask ROM:	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0
	S0 S7	S8 S15
External Switch:	1 0 0 1 1 0 0 0	1 0 1 0 1 1 0 0
	(ROM1)+(S0~S7)	(ROM2)+(S8~S15)
LBO~LB7:	1 0 0 1 1 0 0 0	1 0 1 0 1 1 0 0
	LBC0 LBC7	
HB0~HB7:	[(ROM2)+(S8~S15)]XNOR(LBC0~LBC7):	
	1 1 0 0 1 0 1 1	
	HBC0 HBC7	
Customer Code:	1 0 0 1 1 0 0 0	1 1 0 0 1 0 1 1
	LBC0 LBC7	HBC0 HBC7

(2)RT1221-002/RT1222-002:

The algorithm rule of customer codes(LBC0~LBC7 and HBC0~HBC7)can be define by the internal the external diode, resistors and internal MASK-ROM (ROM2, ROM3-0, ROM3-1, ROM3-2, ROM3-3).

[Example]:



(a)The LBC0~LBC2 are set by external switch S0~S7.The order of priority of external switch is $S7 > S6 > S5 > S4 > S3 > S2 > S1 > S0$, When 2 or more keys are pressed simultaneously, the signal output will have the preferential order of S1~S7.

	LBO	LB1	LB2
S7=1	1	1	1
S6=1	0	1	1
S5=1	1	0	1
S4=1	0	0	1
S3=1	1	1	0
S2=1	0	1	0
S1=1	1	0	0
S0=1	0	0	0
S1=1 ⇒	LBO 1	LB1 0	LB2 0

(b) LB3~LB7 are set by external switch S14, S15.

S14	S15	LB3	LB4	LB5	LB6	LB7	ROM3
0	0	0	0	0	0	0	ROM3-0
0	1	1	1	0	0	1	ROM3-1
1	0	0	0	0	0	1	ROM3-2
1	1	1	0	1	1	1	ROM3-3

S14=1, S15=0 $\Rightarrow$ LB3~LB7=00001

LBC0	LBC7
1 0 0	0 0 0 0 1

(c) HBC0~HBC7 are set by LBC0~LBC7, S8~S13 and Mask ROM2:

LBC0~LBC7: 1 0 0 0 0 0 0 1

Mask ROM2: Bit0 Bit7
0 0 0 0 0 0 0 0

External switch S8 S13
S8~S13: 1 1 1 0 0 0 0 0
Expletive bit

(ROM2)+(S8~S13): 1 1 1 0 0 0 0 0

HBC0~HBC7 = [(ROM2)+(S8~S13)]XNOR(LBC0~LBC7)
= 1 0 0 1 1 1 1 0

Customer Code: LBC0 LBC7 HBC0 HBC7
1 0 0 0 0 0 0 1 1 0 0 1 1 1 1 0

5.Data code:

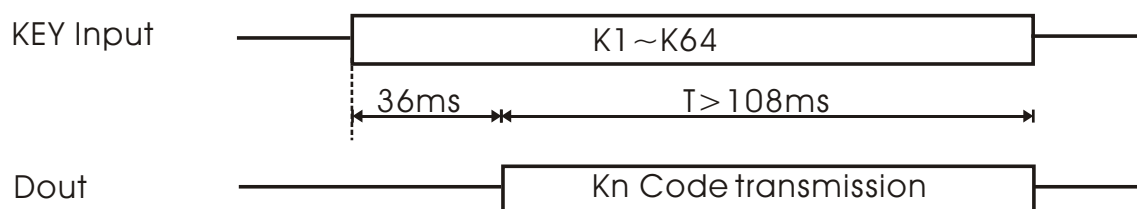
(1)Complete Data code:

There are 8-Bit data code. Each key corresponds to the first 7-Bit data code. The 8th byte(D7) is set by the Data7, Which is defined by an external switch. If DATA7 is connect to VDD, then D7=0, otherwise, DATA7 is connect to VSS, then D7=1 .

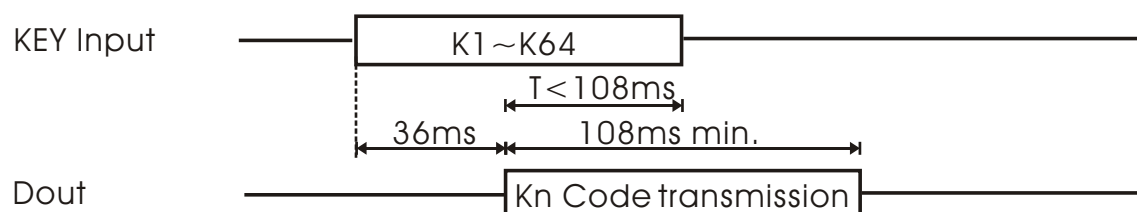
(2)Single-key(Key1 ~Key64) input :

(a)Single-key input method:

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(b)Single-key(key1 ~Key64) data code table:

KEY NO	Data Code		KEY NO	Data Code	
	D0~D6	D7		D0~D6	D7
KEY1	0000 000	0/1	KEY33	0000 001	0/1
KEY2	1000 000	0/1	KEY34	1000 001	0/1
KEY3	0100 000	0/1	KEY35	0100 001	0/1
KEY4	1100 000	0/1	KEY36	1100 001	0/1
KEY5	0010 000	0/1	KEY37	0010 001	0/1
KEY6	1010 000	0/1	KEY38	1010 001	0/1
KEY7	0110 000	0/1	KEY39	0110 001	0/1
KEY8	1110 000	0/1	KEY40	1110 001	0/1
KEY9	0001 000	0/1	KEY41	0001 001	0/1
KEY10	1001 000	0/1	KEY42	1001 001	0/1
KEY11	0101 000	0/1	KEY43	0101 001	0/1
KEY12	1101 000	0/1	KEY44	1101 001	0/1
KEY13	0011 000	0/1	KEY45	0011 001	0/1
KEY14	1011 000	0/1	KEY46	1011 001	0/1
KEY15	0111 000	0/1	KEY47	0111 001	0/1
KEY16	1111 000	0/1	KEY48	1111 001	0/1
KEY17	0000 100	0/1	KEY49	0000 101	0/1
KEY18	1000 100	0/1	KEY50	1000 101	0/1
KEY19	0100 100	0/1	KEY51	0100 101	0/1
KEY20	1100 100	0/1	KEY52	1100 101	0/1
KEY21	0010 100	0/1	KEY53	0010 101	0/1
KEY22	1010 100	0/1	KEY54	1010 101	0/1
KEY23	0110 100	0/1	KEY55	0110 101	0/1
KEY24	1110 100	0/1	KEY56	1110 101	0/1
KEY25	0001 100	0/1	KEY57	0001 101	0/1
KEY26	1001 100	0/1	KEY58	1001 101	0/1
KEY27	0101 100	0/1	KEY59	0101 101	0/1
KEY28	1101 100	0/1	KEY60	1101 101	0/1
KEY29	0011 100	0/1	KEY61	0011 101	0/1
KEY30	1011 100	0/1	KEY62	1011 101	0/1
KEY31	0111 100	0/1	KEY63	0111 101	0/1
KEY32	1111 100	0/1	KEY64	1111 101	0/1

<NOTE>:

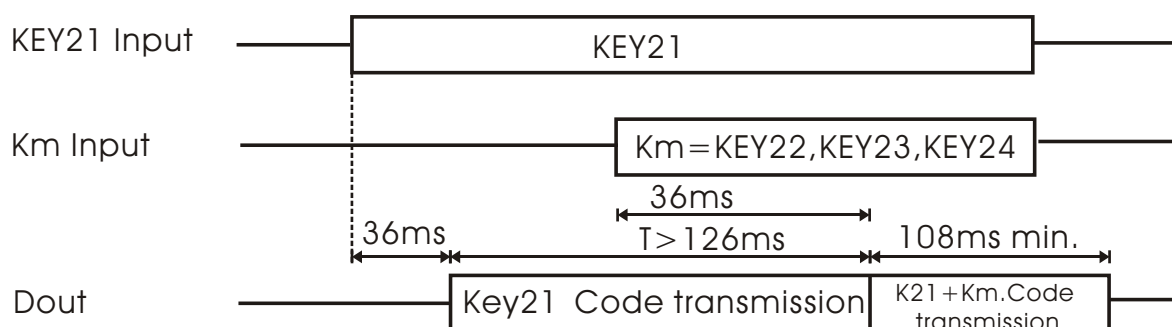
D7=0:DATA7 connect to VDD

D7=1:DATA7 connect to VSS

(3) Double-key input:

RT1221/RT1222 both consist of 3 double key input function (key21 + key22) 、 (Key21 + key23) 、 (key21 + key24).

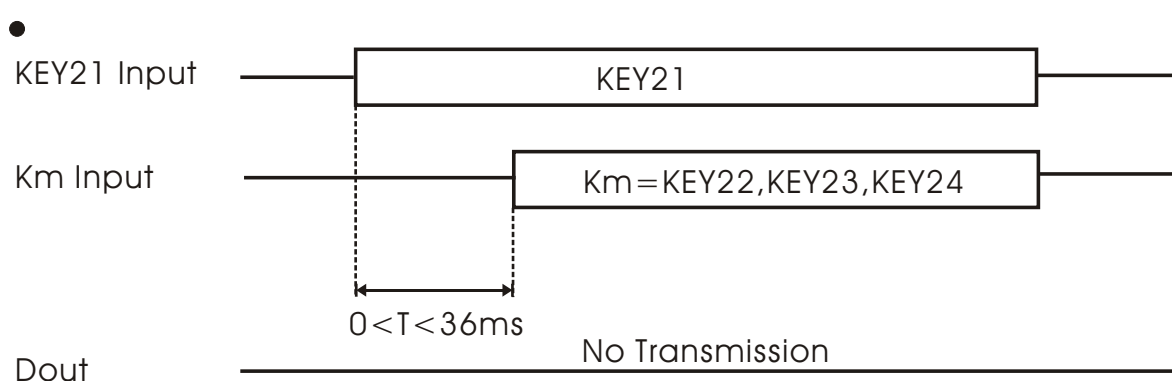
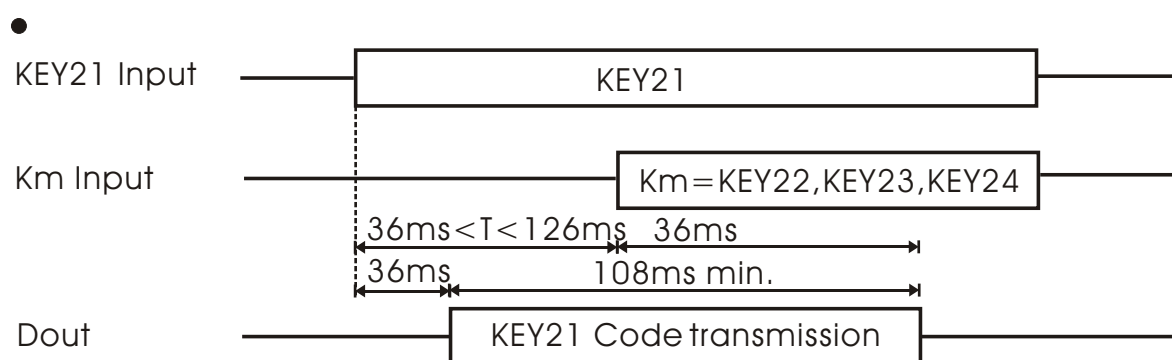
(a) Double-key input format:



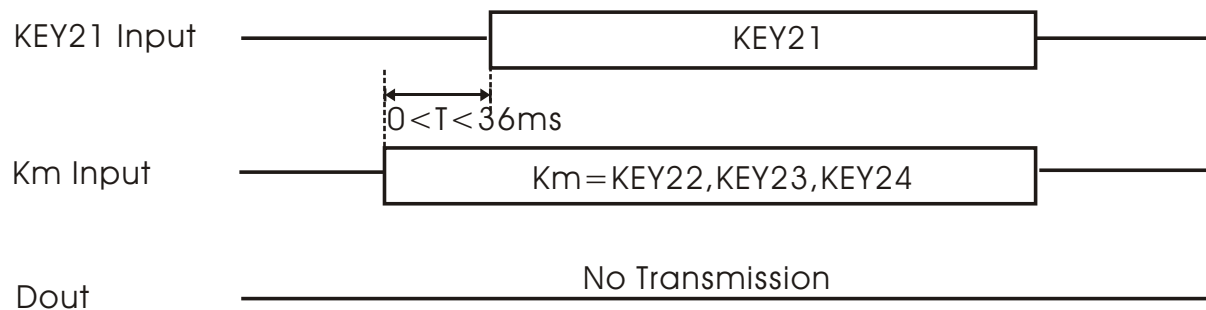
(b) Double-key operation table:

KEY NO	Data Code D0~D6	Data Code D7
KEY21 + KEY22	1010110	1/0
KEY21 + KEY23	0110110	1/0
KEY21 + KEY24	1110110	1/0

(c) Incorrect double key input format:



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