| DEPARTMENT: R&D CENTER | STANDARD SPECIFICATION | PART NUMBER : MT-C210-0107 |

TITLE : **TRANSMITTER ASSY - Standard Specification**

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1	REV.SP01	ORIGINAL RELEASE	1 ~ 11		13.01.07	KIM.H.J
MARK	EO NUMBER	CHANGING LIST	PAGE		CHAGING DATE	WRITER
REVISION DATE 2013.01.07	REFERENCE DATA		DIVISION	WRITER	REVIEWER	APPROVER
			POSITION			
ORIGINAL DATA MANAGEMENT DEPARTMENT			APPROVAL			

1. APPLICATION

THIS SPEC APPLIES TO C210 IMMO & BCM Transmitter ASS'Y.
BUT, IF CONTENT WHAT IS DIFFERENT THIS SPEC EXIST, CONTENTS OF DRAWING SHEET IS FIRST OF ALL

1.1 SUMMARY

WHEN USER CONTROL SWITCH OF TRANSMITTER ASS'Y, DATA FORMAT OF "VEHICLE CONTROL MESSAGE" IS TRANSMITTED TO BCM BY TRANSMITTER'S CPU, AND THEN WHEN BCM RECEIVE THAT MESSAGE, BCM'S CPU CONSIDER TO CONTROL VEHICLE
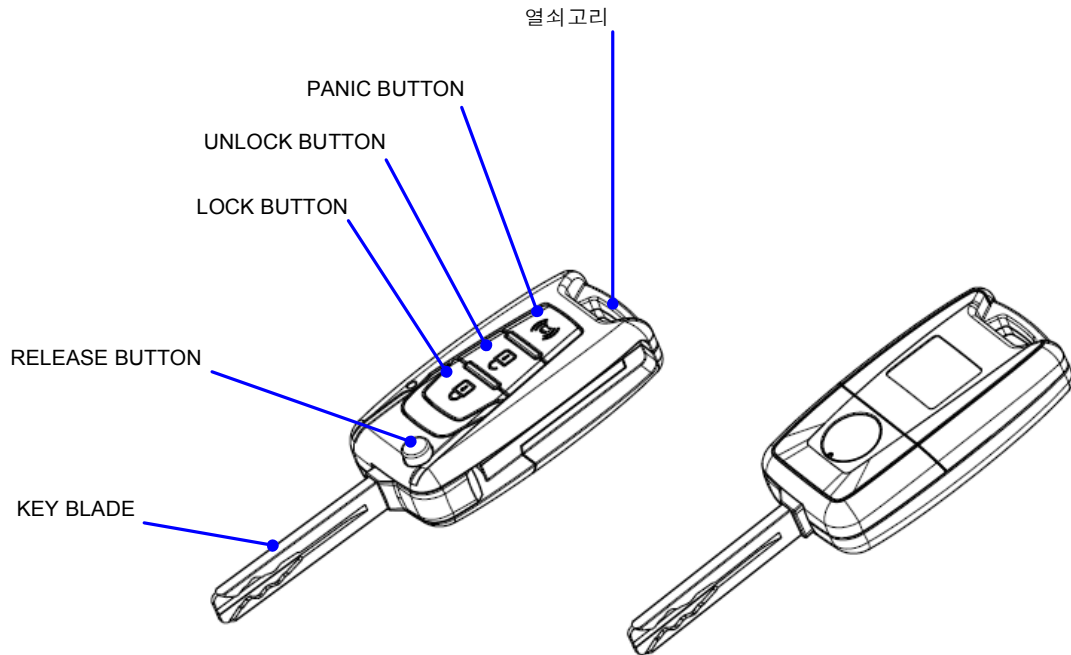
PICTURE 1. Transmitter

EACH SWITCH FUNCTIONS IS SAME TO TABLE 1.1

TABLE 1.1   EACH SWITCH FUNCTIONS OF TRANSMITTER

FUNCTION		SWITCH FUNCTION
LOCK BUTTON	DOOR LOCK	SHORT PRESSING LOCK BUTTON UNDER 0.5s - LED flicker only once as long time
	ESCORT (DOM ONLY)	LONG PRESSING LOCK BUTTON OVER 0.5s - LED flicker twice as short time
UNLOCK BUTTON	DOOR UNLOCK	SHORT PRESSING UNLOCK BUTTON UNDER 0.5s - LED flicker only once as long time
PANIC BUTTON	PANIC	LONG PRESSING PANIC BUTTON OVER 2s - LED flicker twice as short time

2. ELECTRICAL PERFORMANCE

2.1 GENERAL ELECTRICAL PERFORMANCE OF TRANSMITTER ASS' Y

LIST	REQUIREMENTS	NOTE
RATED VOLTAGE	DC 3.0V	
OPERATING VOLTAGE RANGE	DC 2.7V ~ DC 3.3V	NORMAL OPERATING FOR OPERATING TEMPERATURE RANGE
OPERATING TEMPERATURE RANGE	-10℃ ~ +60℃	
STORED TEMPERATURE RANGE	-20℃ ~ +70℃	
INSULATION RESISTANCE	IT DOESN' T EXISTED FEBRILITY OR IGNITION BY LEAKAGE CURRENT	PCB MOISTUREPROOFING AND COATING DEFINE WITH INSULATION REQUIRED ELECTRONIC COMPONENTS
USING DATE	USING ONE DAY PER 10 TIMES, OVER 2 YEARS	
DARK CURRENT	UNDER 1uA	

2.2 WIRELESS CHARACTERISTIC
    2.3.1 DOMESTIC (DOM)
       (1) TRANSMIT FREQUENCY: 433.92MHZ ± 10KHZ(@ ROOM TEMPERATURE)
       (2) CLEAR FREQUENCY BAND WIDTH: 13kHz ± 5kHz
       (3) OUTPUT: 3.981 mW UNDER (6dBm)
       (4) MODULATION METHOD: FM MODULATION
       (5) COMMUNICATION METHOD: HALF DUPLEX METHOD
    2.3.2 GENERAL EXPORT (EXP)
       (1) TRANSMIT FREQUENCY: 433.92MHZ ± 10KHZ(@ ROOM TEMPERATURE)
       (2) CLEAR FREQUENCY BAND WIDTH: 13kHz ± 5kHz
       (3) OUTPUT: 3.981 mW UNDER (6dBm)
       (4) MODULATION METHOD: FM MODULATION
       (5) COMMUNICATION METHOD: HALF DUPLEX METHOD

FCC (Federal Communications Commission)

WARNING: This equipment may generate or use radio frequency energy.

Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual.

The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

This device complies with Part 15 of the FCC`s Rules. Operation is subject to the following two Conditions:

1. This device may not cause harmful interference, and

2. This device must accept ant interference received, including interference that may cause undesirable operation.
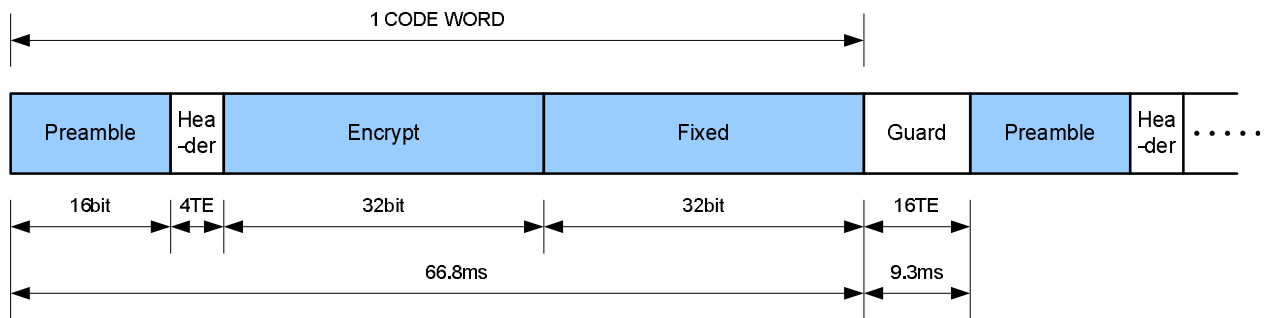
3. FUNCTION

3.1 STRUCTURE OF DATA ("1", "0")

송신 "1" 400us 400us

"0" 400us 400us
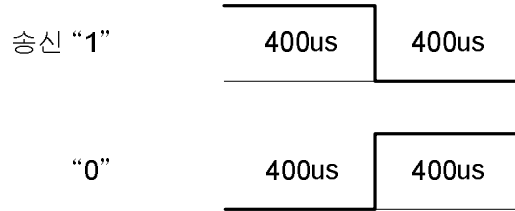
3.2 TRANSMITTER PROTOCOL FORMAT

(1) 송신부의 1회 DATA 전송횟수는 10FRAME으로 구성된다.
(1) ONE TIME TRANSMITTING DATA CONSIST OF 10 FRAMES
(2) 각 FRAME간 전송 간격은 6.8 ± 1ms로 한다.
(2) EACH FRAME DATA THANSMISSION INTERVAL IS 6.8 ± 1ms
(3) 모든 0과 1의 BIT 형태는 PULSE 형태로 구별한다.
(3) ALL OF BIT (0 AND 1) DIFFERENTIATE THE PULSE FORM
(4) CODE WORD TRANSMISSION SEQUENCE (73.6msec)

1 CODE WORD

| Preamble | Hea-der | Encrypt | Fixed | Guard | Preamble | Hea-der | · · · · · |

| 16bit | 4TE | 32bit | 32bit | 16TE |

66.8ms   9.3ms

(5) TRANSMISSION FORMAT (MANCHESTER)

START bit
bit 0 bit 1 bit 2
STOP bit

1 2   16

Preamble   Header   Encrypted Portion   Fixed Code Portion   Guard Time
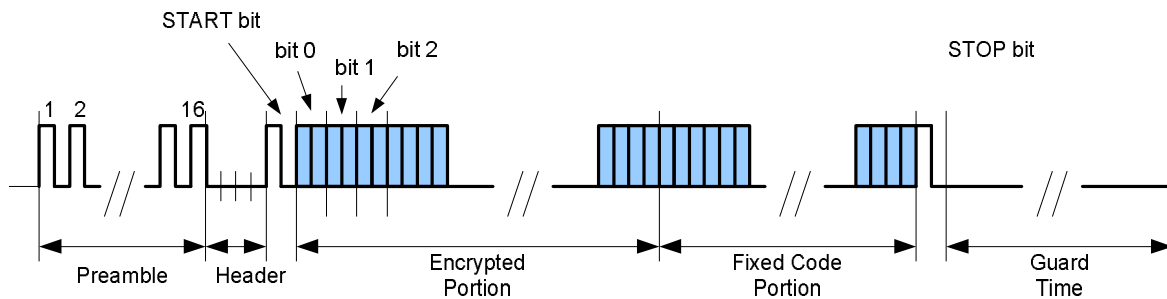
(6) CODE WORD TRANSMISSION DATA FORMAT

Encrypted Portion (32bits)				Fixed Code Portion (32 bits)		
BUT.	Not used	0x5A DISC	Synchronization Counter 16 bits	BUT.	Not used	SERIAL NUMBER
4bits	4bits	4bits	15 0	4bits	4bits	24bits

S2	S1	S0	S3

S2	S1	S0	S3
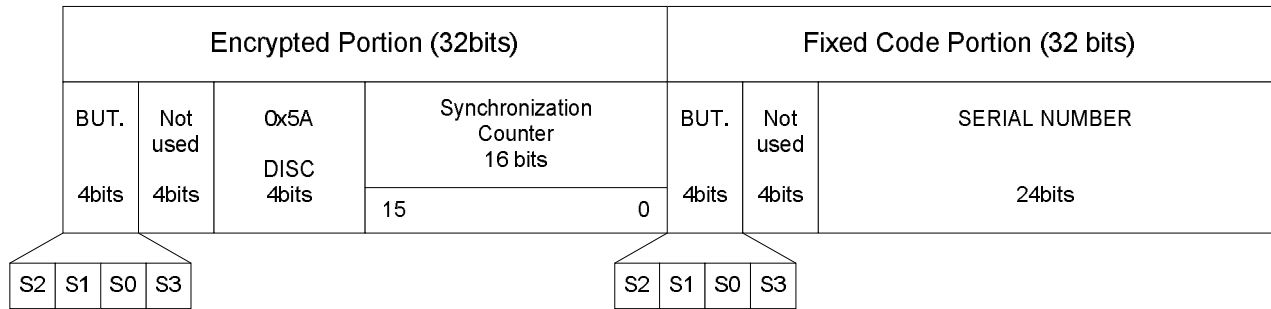
(7) RF Data Format (756msec)

◄─────────────────── 10 Frame ───────────────────►

| 1 Frame | 1 Frame | 1 Frame | 1 Frame | 1 Frame | 1 Frame | 1 Frame | 1 Frame | 1 Frame | 1 Frame |
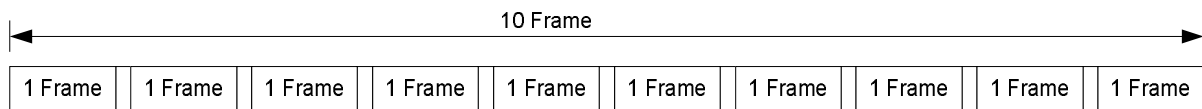
① ┌ Preamble: 16BIT CONSIST OF "0"
② Header: CONSIST OF Low Level FOR 4TE(Timing Element)
③ Start Bit: 1Bit CONSIST OF "1"
④ Encrypted Portion: CONSIST OF 32Bit (TABLE 3-1)
⑤ Fixed Code Portion: CONSIST OF 32Bit (TABEL 3-2)

TABLE 3-1 Encrypted Portion Information

| Bit Address	Field	Description	Values
0 ~ 15	Count	Synchronization Counter	Synchronization Counter Value
16 ~ 17	BSEL_0, BSEL_1	Bit rate select	00- TE= 100 us 01- TE= 200 us 10- TE= 400 us * 11- TE= 800 us
18 ~ 19	MTX_0, MTX_1	Minimum number of code words	00- 1 01- 4 10- 10 * 11- 16
20 ~ 21	GUARD_0, GUARD_1	Guard time select	00- 0 ms (1 TE) 01- 6.8 ms + 2 TE * 10- 25.6 ms + 2 TE 11- 76.8 ms + 2 TE
22	MOD	Modulation Format	0 = PWM 1 = MANCHESTER *
23	HEADER	Header Length	0 = Short Header, TH = 4 x TE * 1 = Standard Header, TH = 10 x TE
24 ~ 27			Not Used
28 ~ 31	S3, S0, S1, S2	Button Status	S3, S2, S1, S0 0 0 0 1 = DOOR LOCK 0 0 1 0 = DOOR UNLOCK 0 0 1 1 = PANIC 0 1 0 0 = ESCORT

TABLE 3-2 Fixed Portion Information

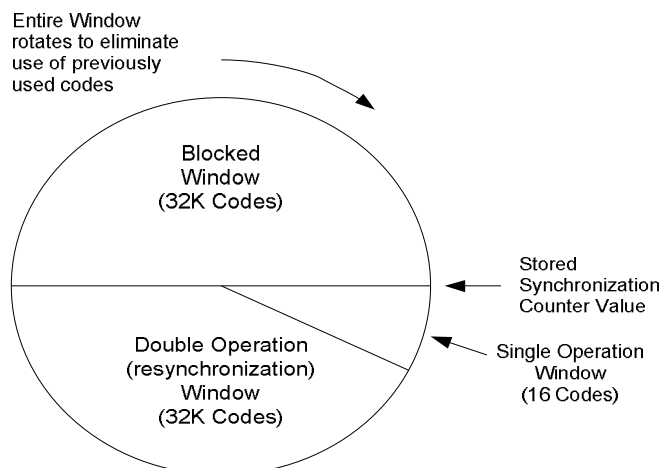| Bit Address	Field	Description	Values
32 ~ 55	ID0 ~ ID23	Serial Number	
56 ~ 59			0 0 1 0
60 ~ 63	S3, S0, S1, S2	Button Status	S3, S2, S1, S0 0 0 0 1 = DOOR LOCK 0 0 1 0 = DOOR UNLOCK 0 0 1 1 = PANIC 0 1 0 0 = ESCORT

3.3 BUILDING THE TRANSMITTED CODE WORD (ENCODER)
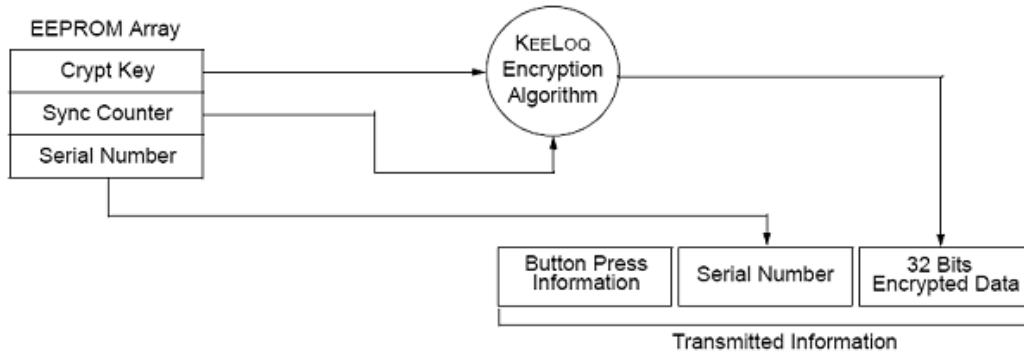
3.4 BASIC OPERATION OF RECEIVER (DECODER)
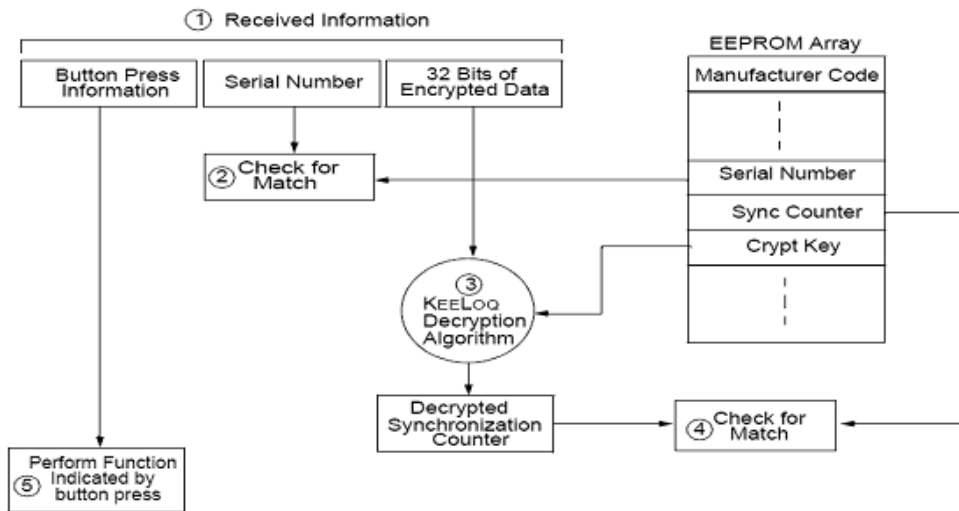

3.5 SYNCHRONIZATION WINDOW

3.6 LED FLICKERING PROCEDURE
LED FLICKERING PERFORM ON/OFF PROCEDURE

TABLE 3-3 LED TURNED THE LIGHT ON TIME BY EACH FUNCTION

	1 Frame	1 Frame	1 Frame	1 Frame	1 Frame	1 Frame	1 Frame	1 Frame	1 Frame	1 Frame
LOCK	ON(756ms)									
ESCORT	ON(226ms)		OFF(304ms)			ON(226ms)				
UNLOCK	ON(756ms)									
PANIC	ON(226ms)		OFF(304ms)			ON(226ms)				

3.7 RADIO FREQUENCY TRANSMISSION PROCEDURE

TABLE 3-4 TX TRANSMISSION FLOW CHART
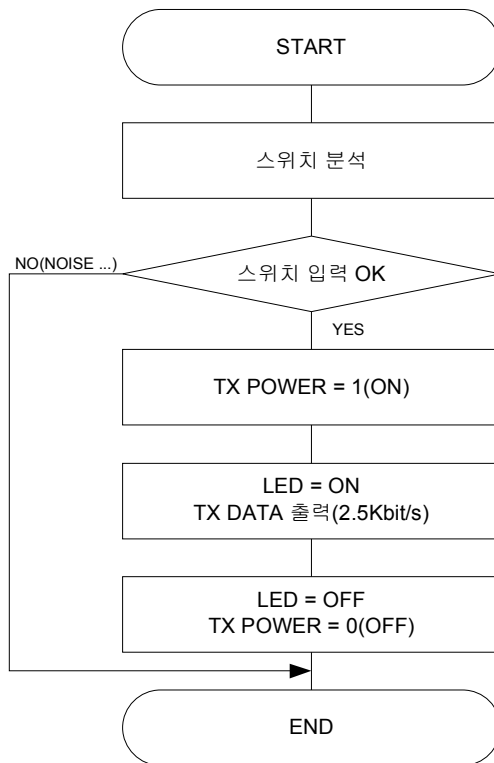
3.8 REMOCON FUNCTION OF EACH SIGNAL

TABLE 3-8 REMOCON FUNCTION OF EACH SIGNAL

SYMBOL	SIGNAL NAME	I/O (PIN NO)	CONTENTS	OPERATING	NOTE
VSS	GND	POWER (14)	Ground		
RA0	LOCK	INPUT (13)	HIGH: PRESSING	- SHORT PRESSING - DOOR LOCK - LONG PERSSING - ESCORT	
RA1	UNLOCK	INPUT (12)	HIGH: PRESSING	- SHORT PRESSING - DOOR UNLOCK	
RA2	Not Used	(11)			Spare IO Port
RC0	POWER CON	OUTPUT (10)	POWER DOWN MODE OUTPUT	WHEN OPERATING FINISH, IT IS SLEEP MODE	
RC1	Not Used	(9)			Spare IO Port
RC2	TX DATA	OUTPUT (8)	RF DATA OUTPUT	DATA OUTPUT ABOUT SWITCH INPUT	625Hz
RC3	PA CON	OUTPUT (7)	RF PA OUTPUT	POWER AMP CONTROL	736ms
RC4	LED	OUTPUT (6)	LOW: LED ON	Data OUTPUT Display	
RC5	Not Used	(5)			Spare IO Port
/MCLR	RESET	INPUT (4)	WHEN POWER TURN ON, IT RESET		
RA4	PANIC	INPUT (3)	HIGH: PRESSING	- LONG PRESSING - PANIC	Spare IO Port
RA5	Not Used	(2)			Spare IO Port
VDD	BAT	POWER (1)	BAT POWER SUPPLY	- POWER SUPPLY TO MICOM	NORMAL : 2.1V < BAT < 3.5V

3.9 POWER ON INITIALIZATION
(1) DEFINE ABOUT ALL OF I/O (INPUT/OUTPUT) PINS
(2) WHEN CPU CHANGE FROM POWER DOWN MODE TO ACTIVE MODE, DEFINE EACH PORT'S CONDITION

SYMBOL	PIN NO	I/O	CONDITION	CONTENTS	SYMBOL	PIN NO	I/O	CONDITION	CONTENTS
VDD	1	POWER	HIGH		RC2	8	OUTPUT	-	DATA
RA5	2	-	-	Not Used	RC1	9	-	-	Not Used
RA4	3	INPUT	HIGH	HIGH PERCEIVING	RC0	10	OUTPUT	HIGH	HIGH ON
/MCLR	4	INPUT	HIGH	LOW PERCEIVING	RA2	11	-	-	Not Used
RC5	5	-	-	Not Used	RA1	12	INPUT	HIGH	HIGH PERCEIVING
RC4	6	OUTPUT	LOW	LOW ON	RA0	13	INPUT	HIGH	HIGH PERCEIVING
RC3	7	OUTPUT	HIGH	HIGH ON	VSS	14	POWER	LOW	Ground

4. OPERATING

4.1 REMOTE DOOR LOCK

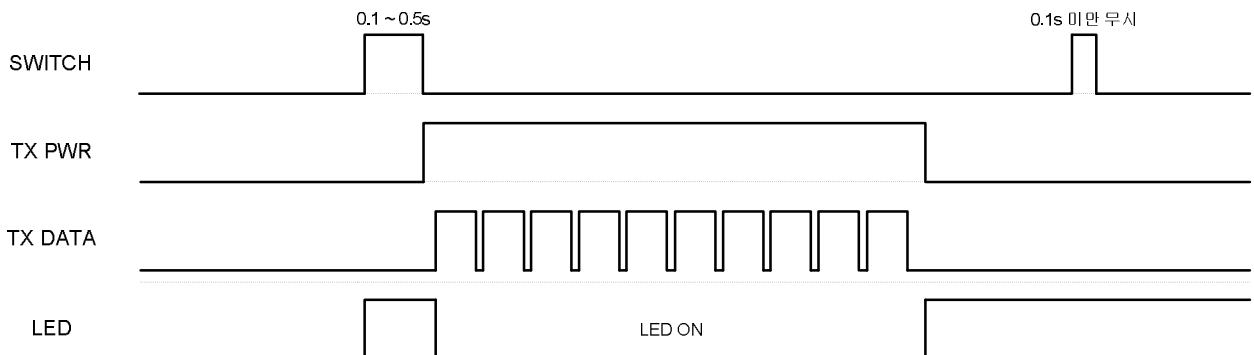WHEN SWITCH OF TRANSMITTER PRESSE UNDER 0.5s, IT PERFORM VEHICLE'S DOOR LOCK FUNCTION

(1) AFTER SWITCH PRESSING (PRESSING TIME = 0.1 ~ 0.5s), IMMEDIATELY TRANSMITTER IS POWER ON AND TRANSMIT DATA

(2) DURING MICOM TRANSMIT DATA, IF BUTTON INPUT ENTER, MICOM IGNORE THAT SIGNAL AND IT PERFORM EXISTING OPERATING

(3) IF SWITCH PRESSING TIME IS UNDER 0.1s, MICOM IGNORE THAT SIGNAL

(4) WHEN ALL OF OUTPUT COMPLETING, IF NOTHING HAPPENS WITHIN 20 ± 5ms, IT WILL BE ENTERED "POWER DOWN MODE"
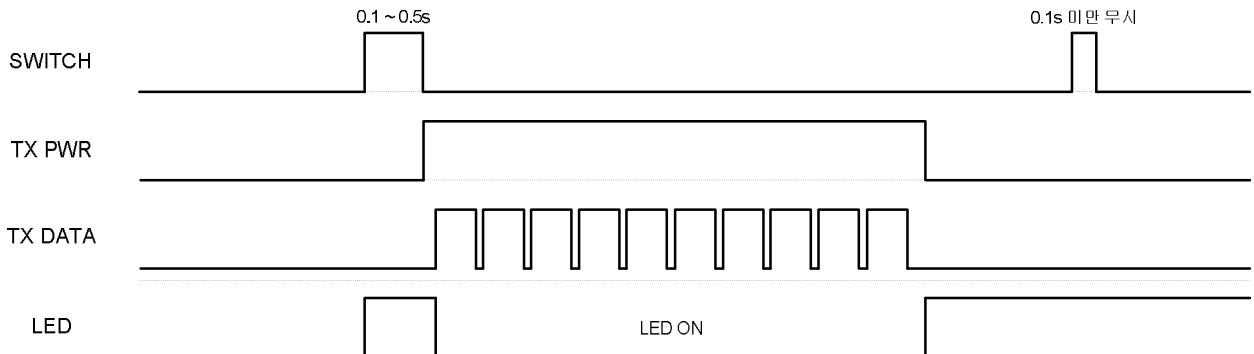
4.2 REMOTE DOOR UNLOCK

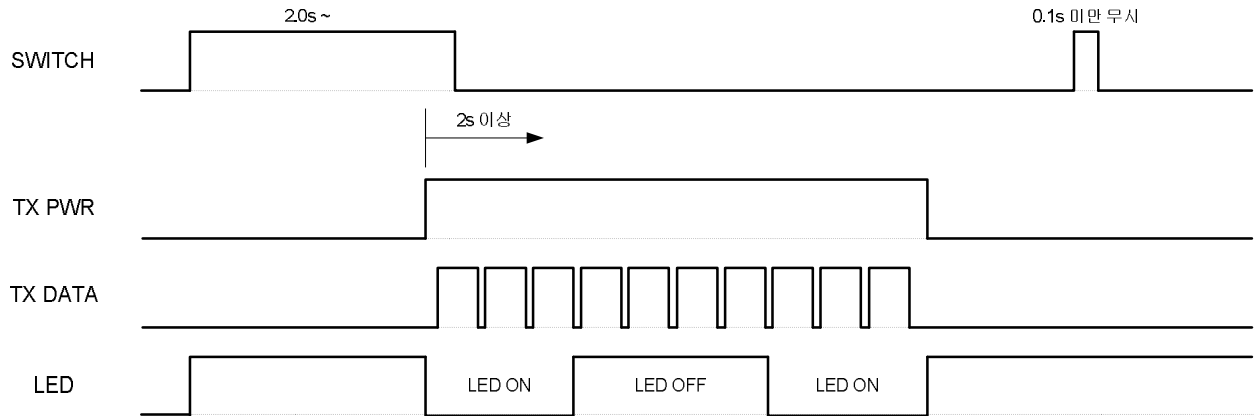WHEN SWITCH OF TRANSMITTER PRESS UNDER 0.5s, IT PERFORM VEHICLE'S DOOR UNLOCK FUNCTION.

(1) AFTER SWITCH PRESSING (PRESSING TIME = 0.1 ~ 0.5s), IMMEDIATELY TRANSMITTER IS POWER ON AND TRANSMIT DATA

(2) DURING MICOM TRANSMIT DATA, IF BUTTON INPUT ENTER, MICOM IGNORE THAT SIGNAL AND IT PERFORM EXISTING OPERATING

(3) IF SWITCH PRESSING TIME IS UNDER 0.1s, MICOM IGNORE THAT SIGNAL.

(4) WHEN ALL OF OUTPUT COMPLETING, IF NOTHING HAPPENS WITHIN 20 ± 5ms, IT WILL BE ENTERED "POWER DOWN MODE"

4.3 PANIC FUNCTION

WHEN SWITCH OF TRANSMITTER PRESS OVER 2s, IT PERFORM VEHICLE'S PANIC FUNCTION.

(1) IF SWITCH IS PRESSED LONGER THAN 2s, AT THE SAME TIME, TRANSMITTER IS POWER ON AND TRANSMIT DATA

(2) DURING MICOM TRANSMIT DATA, IF BUTTON INPUT ENTER, MICOM IGNORE THAT SIGNAL AND IT PERFORM EXISTING OPERATING

(3) WHEN ALL OF OUTPUT COMPLETING, IF NOTHING HAPPENS WITHIN 20 ± 5ms, IT WILL BE ENTERED "POWER DOWN MODE"

4.4 ESCORT FUNCTION (DOM ONLY)

WHEN SWITCH OF TRANSMITTER PRESSE OVER 0.5s, IT PERFORM VEHICLE'S ESCORT FUNCTION

(1) IF SWITCH IS PRESSED LONGER THAN 0.5s, WHEN THE TIME BECOME 1s, TRANSMITTER IS POWER ON AND TRANSMIT DATA

  (2) DURING MICOM TRANSMIT DATA, IF BUTTON INPUT ENTER, MICOM IGNORE THAT SIGNAL AND IT PERFORMS EXISTING OPERATING.

(3) WHEN ALL OF OUTPUT COMPLETING, IF NOTHING HAPPENS WITHIN 20 ± 5ms, IT WILL BE ENTERED "POWER DOWN MODE"

(4) LED IS NOT OPERATING
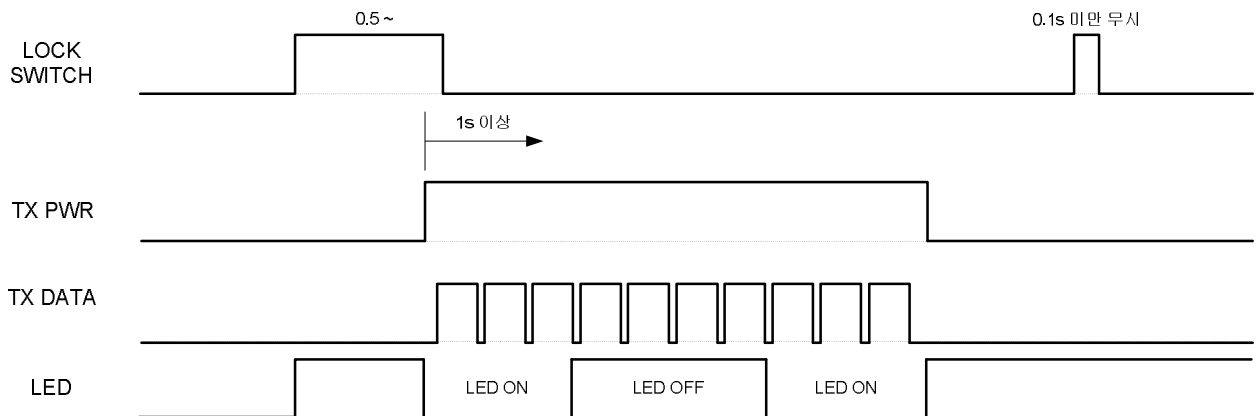
4.5 ID CODE

(1) RECEVING THE SAME ID CODE NOT ONLY TRANSMITTER, BUT ALSO BCM

  ID CODE IS CONTROLED VEHICLE BY WIRELESS, SO TO MAINTAINED ACCURATE VEHICLE OPERATION AND TO PREVENTED MALFUNCTION OF VEHICLE BYINTERFERENCE ARE VERY IMPORTANT , THEREFORE IT MUST BE CHOSEN CAREFULLY IN TERM OF A THEFT OF THE VEHICLE AND THE USER'S SATISFACTION AND POST-MANAGEMENT

(2) ID CODE COMPOSITION

  ID CODE IS WHAT CONBINE "24 MULTIPLIER OF 2" CODE
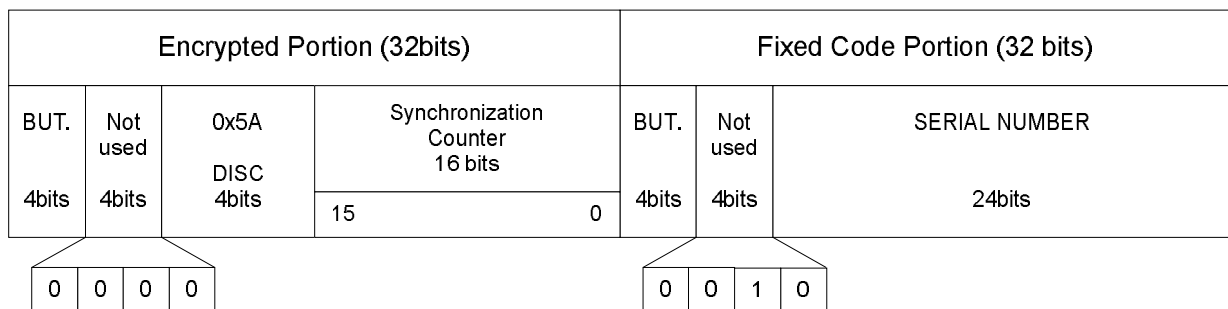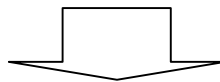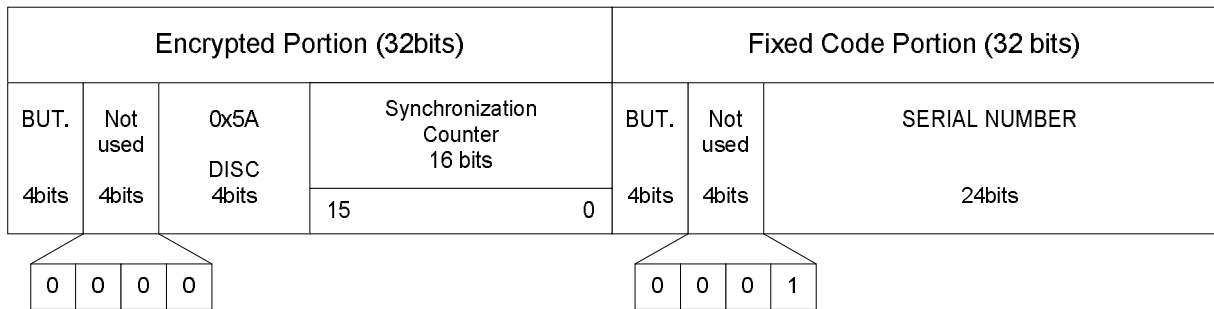
4.6 REMOCON RESPONSE OF OPERATING CONTINUOUS SWITCH

(1) WHEN SWITCH IS PRESSING, IT BASICALLY TRANSMIT 10 FRAME

(2) DURING TRANSMIT 10 FRAMES, IF THE SWITCH PRESSES SEVERAL TIMES, MICOM IGNORE CONTINUOUS SWITCH AND PERFORM EXISTING TRANSMISSION

(3) EXISTING SWITCH OPERATING IGNORE NEXT SWITCH OPERATING

SWITCH   SW입력   송신중 SW입력 무시

TX PWR

TX DATA
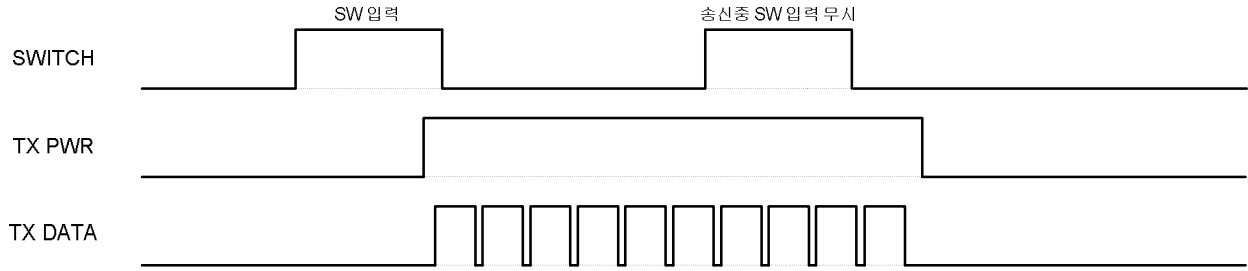
5. REVISION LIST
5.1 REVISION SP01 (2008-09-01)
(1) LIST : 3-2의 6) CODE WORD TRANSMISSION
(2) NOT USED RANGE OF Fixed Code Portion : 0001 => 0010

Encrypted Portion (32bits)				Fixed Code Portion (32 bits)		
BUT. 4bits	Not used 4bits	0x5A DISC 4bits	Synchronization Counter 16 bits 15 0	BUT. 4bits	Not used 4bits	SERIAL NUMBER 24bits

| 0 | 0 | 0 | 0 |

| 0 | 0 | 0 | 1 |

Encrypted Portion (32bits)				Fixed Code Portion (32 bits)		
BUT. 4bits	Not used 4bits	0x5A DISC 4bits	Synchronization Counter 16 bits 15 0	BUT. 4bits	Not used 4bits	SERIAL NUMBER 24bits

| 0 | 0 | 0 | 0 |

| 0 | 0 | 1 | 0 |

5.1 REVISION SP01 (2013-01-07)
(1) LIST: ORIGINAL RELEASE