

GLOBALTEC ELECTRONICS LTD.

GTEC-001

INFRARED RAY REMOTE CONTROL DUAL CODE TRANSMITTER IC

SPECIFICATION VERSION 1.0

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INTRODUCTION

GTEC-001 is a dual transmission format infrared remote transmitter using Lucky Goldstar CMOS LSI. The formats are Toshiba TC9148 and TC9243. Both formats are widely applied to audio system, CD player etc.

1. Features
 - 1.1. Dual Transmission format
 - 1.1.1. 8 x 4 key matrix for Toshiba TC9243
 - 1.1.2. 6 x 3 key matrix for Toshiba TC9148P
 - 1.2. CMOS architecture with single 3V supply.
 - 1.3. Wide working voltage: VDD 2.0 to 4.0 V*.
 - 1.4. Less component; built in capacitor for ceramic oscillation circuit.
 - 1.5. Transmission indicator for TC9243 mode.
 - 1.6. Low power dissipation: $I_{stop} \leq 1\mu A$ at stop mode.
 - 1.7. Oscillation frequency: 455KHz
 - 1.8. Oscillator: 455KHz resonator
- 2.0. APPLICATION
TV, VCR, MUSIC COMPO, AUDIO SYSTEM, CD PLAYER, etc..
- 3.0. PACKAGE
 - 3.1. Part No: GTEC-001S - SOP20
 - 3.2. Part No: GTEC-001D - PDIP20 (20 pin plastic DIP)

* In case of using 455KHz resonator

4.0.

PIN CONFIGURATION

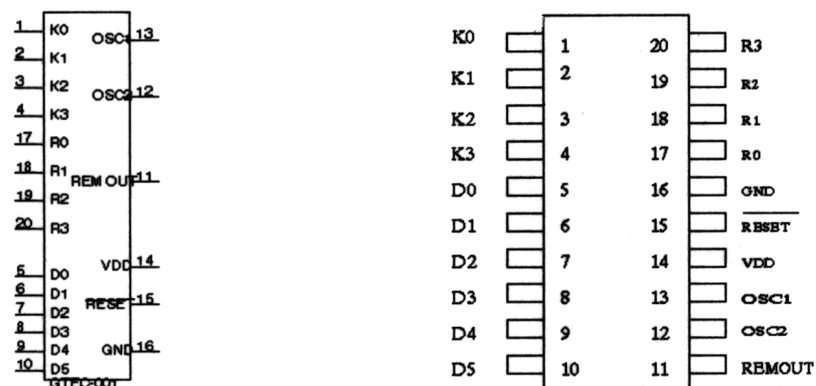


Figure 1. GTEC001 pin assignment

4.1.

PIN DESCRIPTION

PIN NO.	PIN	I/O	DESCRIPTION	NOTE
1 - 4	K0 - K3	I	Input port	120K Ω pull-up resistor
5 - 10	D0 - D5	O	Open drain output	
17 - 20	R0 - R3	I/O	Input /output port	120K Ω pull-up resistor
11	REMOUT	O	High current source output	
12	OSC2	O	Oscillator output	Built in resonance capacitor
13	OSC1	I	Oscillator input	Built in resonance capacitor
15	RESET	I	Low active	Built in about 400 K Ω pull-up resistor
14	VDD		Connected to 2.0 - 4.0 V D.C.	
16	GND		Connected to 0V	

- 5.0.
- TC9148 MODE DETAIL DESCRIPTION

- 5.1.
- TC9148 mode will only be accessed by connecting the circuit as the Figure 3 below.

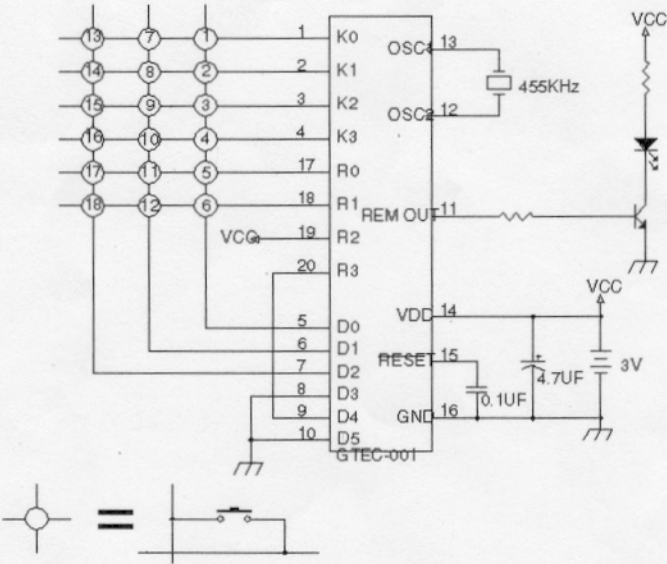
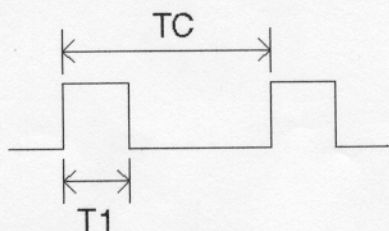


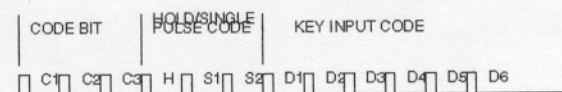
Figure 3 TC9148 circuit diagram

OUTPUT WAVEFORM OF TC9148P



A SINGLE PULSE
 MODULATED WITH 37.917KHz SIGNAL AT 455KHz
 CARRIER FREQUENCY
 $f_{CAR} = 1/TC = f_{OSC}/12$
 DUTY RATIO = $T1/TC = 1/3$

CONFIGURATION OF FLAME

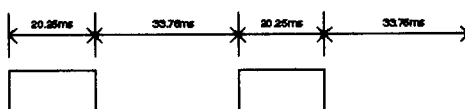


BIT DESCRIPTION

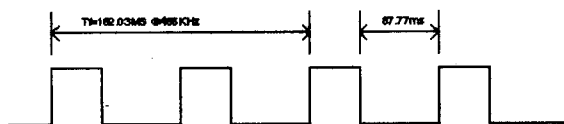


5.2. OUTPUT WAVEFORM OF TC9148P

FLAME INTERVAL
SINGLE KEY



CONTINUOUS KEY



5.3. KEY MATRIX

5.3.1. Key Nos. 1 - 6 are continuous keys. No multiple keying is allowed.

5.3.2. Key Nos 7 - 18 are single shot keys.

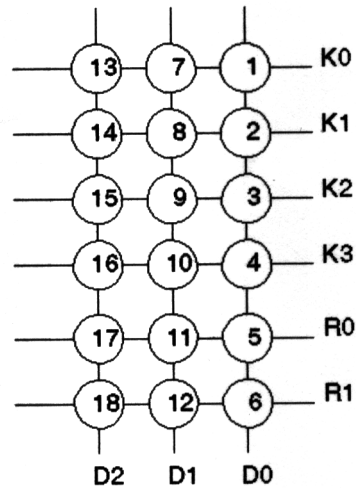


Figure 7 TC9148 KEY MATRIX

5.4. TRANSMISSION COMMAND

Transmission command is in one word 12 bits configuration. Code bits are preset to 110, H, S1 AND S2 are continuous signal and single shot signal. D1 - D6 are key input data codes in 6 bits.

Code bit			H	S1, S2		DATA BIT					
1	1	0	H	S1	S2	D1	D2	D3	D4	D5	D6

5.5.

TRUTH TABLE FOR TC9148

CODE BIT (C1 ~ C3): 110

KEY NO	DATA									OUTPUT FORM
	H	S1	S2	D1	D2	D3	D4	D5	D6	
1	1	0	0	0	0	0	0	0	1	CONTINUOUS
2	1	0	0	0	0	0	0	1	0	CONTINUOUS
3	1	0	0	0	0	0	1	0	0	CONTINUOUS
4	1	0	0	0	0	1	0	0	0	CONTINUOUS
5	1	0	0	0	1	0	0	0	0	CONTINUOUS
6	1	0	0	1	0	0	0	0	0	CONTINUOUS
7	0	1	0	0	0	0	0	0	1	SINGLE
8	0	1	0	0	0	0	0	1	0	SINGLE
9	0	1	0	0	0	0	1	0	0	SINGLE
10	0	1	0	0	0	1	0	0	0	SINGLE
11	0	1	0	0	1	0	0	0	0	SINGLE
12	0	1	0	1	0	0	0	0	0	SINGLE
13	0	0	1	0	0	0	0	0	1	SINGLE
14	0	0	1	0	0	0	0	1	0	SINGLE
15	0	0	1	0	0	0	1	0	0	SINGLE
16	0	0	1	0	0	1	0	0	0	SINGLE
17	0	0	1	0	1	0	0	0	0	SINGLE
18	0	0	1	1	0	0	0	0	0	SINGLE

6.0. TC9243 MODE DETAIL DESCRIPTION

6.1. TC9243 mode will be accessed by connecting the circuit as figure 8 as below.

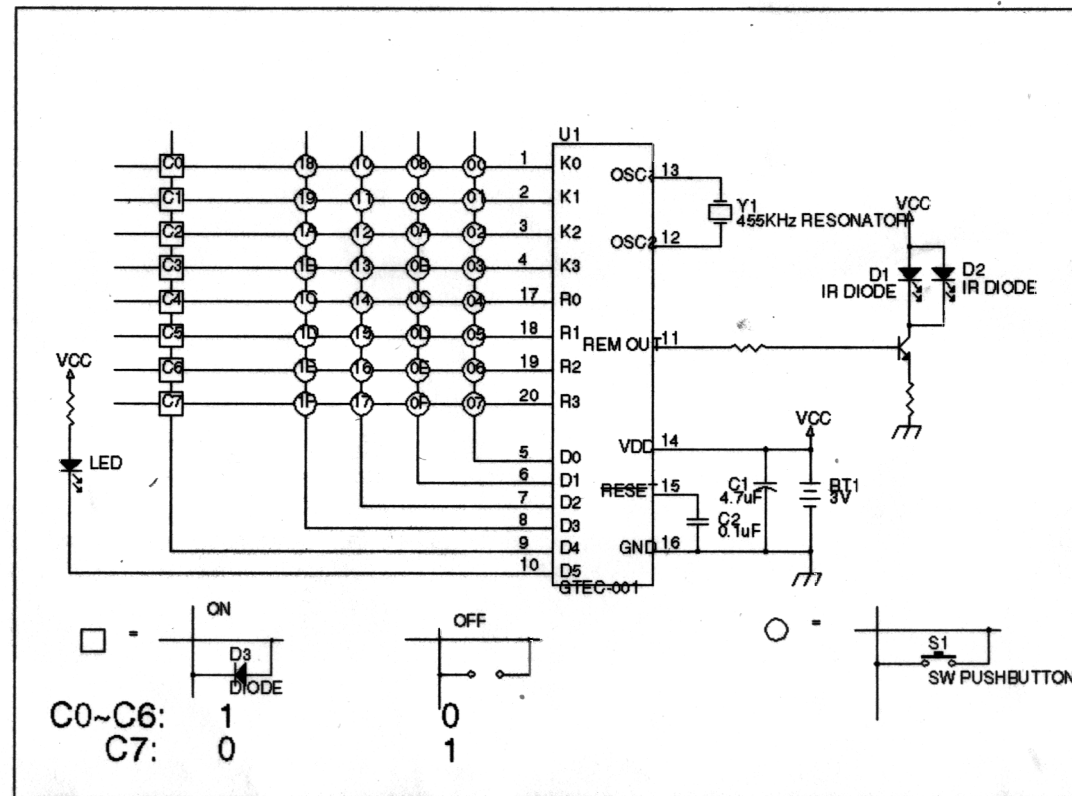


Figure 8. TC9243 CIRCUIT DIAGRAM

6.2. OPERATION DESCRIPTION

GTEC001 can provide 32 keys operation under TC9243 mode and system codes are set by the 7 bits in the combination of C0 - C6.

6.2.1. SYSTEM CODE

System code setting is made by connecting a diode between customer key and K0 - K3 and R0 - R2. Customer code bit will be set to "1" with a connected diode. C7 set internally to "1", not need to connect a diode as the cost saving purpose.

6.2.2. Customer code can be set from \$80 to \$FFh.

6.2.3. Data format

SYSTEM CODE								SYSTEM CODE								KEY DATA CODE								INVERSE KEY DATA CODE							
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	D	D	D	D	D	D	D	D	I	I	I	I	I	I	I	
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7

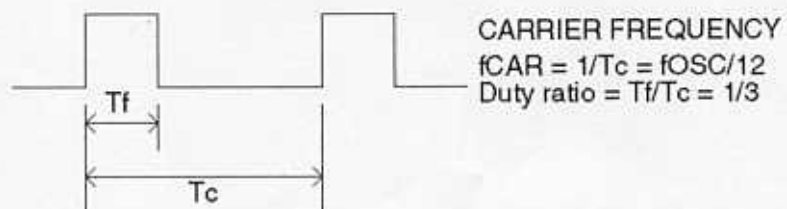
6.3.

TRUTH TABLE OF TC9243

KEY NO	DATA								
	HEX	D7	D6	D5	D4	D3	D2	D1	D0
K01	20	0	0	1	0	0	0	0	0
K02	01	0	0	0	0	0	0	0	1
K03	02	0	0	0	0	0	0	1	0
K04	03	0	0	0	0	0	0	1	1
K05	04	0	0	0	0	0	1	0	0
K06	05	0	0	0	0	0	1	0	1
K07	06	0	0	0	0	0	1	1	0
K08	07	0	0	0	0	0	1	1	1
K09	60	0	1	1	0	0	0	0	0
K10	09	0	0	0	0	1	0	0	1
K11	0A	0	0	0	0	1	0	1	0
K12	0B	0	0	0	0	1	0	1	1
K13	0C	0	0	0	0	1	1	0	0
K14	0D	0	0	0	0	1	1	0	1
K15	0E	0	0	0	0	1	1	1	0
K16	0F	0	0	0	0	1	1	1	1
K17	A0	1	0	1	0	0	0	0	0
K18	11	0	0	0	1	0	0	0	1
K19	12	0	0	0	1	0	0	1	0
K20	13	0	0	0	1	0	0	1	1
K21	14	0	0	0	1	0	1	0	0
K22	15	0	0	0	1	0	1	0	1
K23	16	0	0	0	1	0	1	1	0
K24	17	0	0	0	1	0	1	1	1
K25	E0	1	1	1	0	0	0	0	0
K26	19	0	0	0	1	1	0	0	1
K27	1A	0	0	0	1	1	0	1	0
K28	1B	0	0	0	1	1	0	1	1
K29	1C	0	0	0	1	1	1	0	0
K30	1D	0	0	0	1	1	1	0	1
K31	1E	0	0	0	1	1	1	1	0
K32	1F	0	0	0	1	1	1	1	1

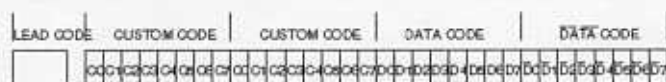
6.4 TC9243 OUTPUT WAVEFORM

A SINGLE PULSE, MODULATED WITH 37.917KHz SIGNAL AT 455KHz

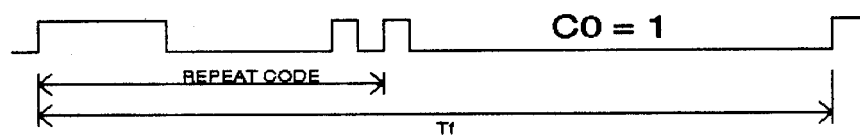
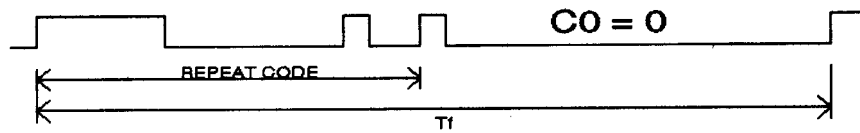


CONFIGURATION OF FLAME

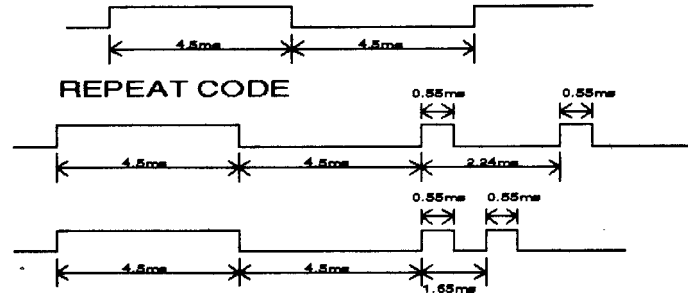
1ST FLAME



REPEAT FLAME

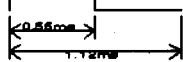


LEAD CODE

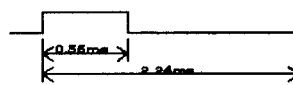


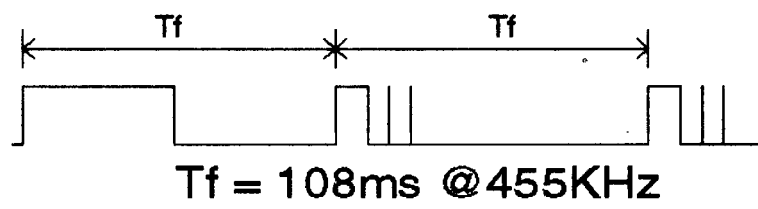
BIT DESCRIPTION

BIT "0"



BIT "1"





7.0. ELECTRICAL CHARACTERISTICS

7.1. ABSOLUTE MAXIMUM RATINGS ($T_a=25^{\circ}\text{C}$)

PARAMETER	SYMBOL	MAX.RATING	UNIT
Supply voltage	VDD	-0.3 - 5.0	V
Power dissipation	PD	700*	mW
Storage temperature range	Tstg	-55 - 125	$^{\circ}\text{C}$
Input voltage	VIN	-0.3 - VDD+0.3	V
Output voltage	VOUT	-0.3 - VDD+0.3	V

*Thermal debating above 25°C : 6mW per degree $^{\circ}\text{C}$ rsie in temperature

7.2. RECOMMENDED OPERATION CONDITION

PARAMETER	SYMBOL	RATING	UNIT
Supply voltage	VDD	2.0 - 4.0*	V
Operating temperature	Topr	-20 - +75	$^{\circ}\text{C}$

* In case of using 455KHz resonator

7.3.

Electrical characteristics ($T_a=25^{\circ}\text{C}$ and $V_{DD}=3\text{V}$ unless otherwise specified)

PARAMETER	SYMBOL	LIMITS			UNIT	CONDITION
		Min.	Typ.	Max.		
Input H current	I_{IH}	-	-	1	μA	$V_I=V_{DD}$
RESET input L current	I_{IL2}	-3	-7.5	-16	μA	$V_I=GND$
K, R input L current	I_{IL1}	-9	-25	-50	μA	$V_I=GND$, Output off, Pull-up resistor provided
K, R input H voltage	V_{IH1}	2.1	-	-	V	-
K, R input L voltage	V_{IL1}	-	-	0.9	V	-
RESET input H voltage	V_{IH2}	2.25	-	-	V	-
RESET input L voltage	V_{IL2}	-	-	0.75	V	-
D, R output L voltage	V_{OL2}	-	0.15	0.4	V	$I_{OL}=1\text{mA}$
REMOUT output L voltage	V_{OL1}	-	0.15	0.4	V	$I_{OL}=100\mu\text{A}$
REMOUT output H voltage	V_{OH1}	2.1	2.5	-	V	$I_{OH}=-8\text{mA}$
OSC2 output L voltage	V_{OL3}	-	0.4	0.9	V	$I_{OL}=70\mu\text{A}$
OSC2 output H voltage	V_{OH3}	2.1	2.5	-	V	$I_{OH}=-70\mu\text{A}$
D,R output leakage current	I_{LO}	-	-	1	μA	$V_O=V_{DD}$, Output off
Current on STOP mode	I_{STOP}	-	-	1	μA	At STOP mode
Operating supply current 1	I_{DD1}	-	0.3	1.0	mA	$f_{osc}=455\text{KHz}$
Operating supply current 2	I_{DD2}	-	0.25	-	mA	$f_{osc}=1\text{MHz}$
Operating frequency	f_{osc}	0.3	-	1	MHz	