

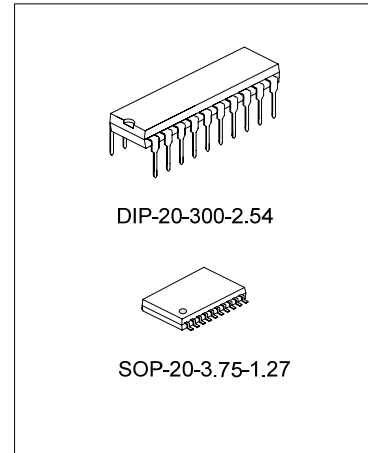
INFRARED REMOTE CONTROL TRANSMITTER OF 9012 CODE FORMAT

DESCRIPTION

SC9243 is an infrared remote control transmitter utilizing CMOS Technology specially designed for electrical appliances such as Audio System, Television, Video Cassette Recorder, CD Player and others. SC9243 is capable of multiple keying; thus, a maximum of 144 instructions is possible. The pin assignments and application circuit are optimized for easy PCB Layout and cost saving advantage.

FEATURES

- * CMOS Technology, Low Power Consumption
- * Least External Components
- * Up To 144 Instructions (32 Basic + 112 Multiple Keys)
- * Multiple Keying Is Possible
- * Wide Range Of Operating Supply Voltage: 2~4 Volts
- * 7 Out Of 8 System Code Bits Are Pre-Settable
- * Interference From Other Equipment Or Apparatus Is Prevented.



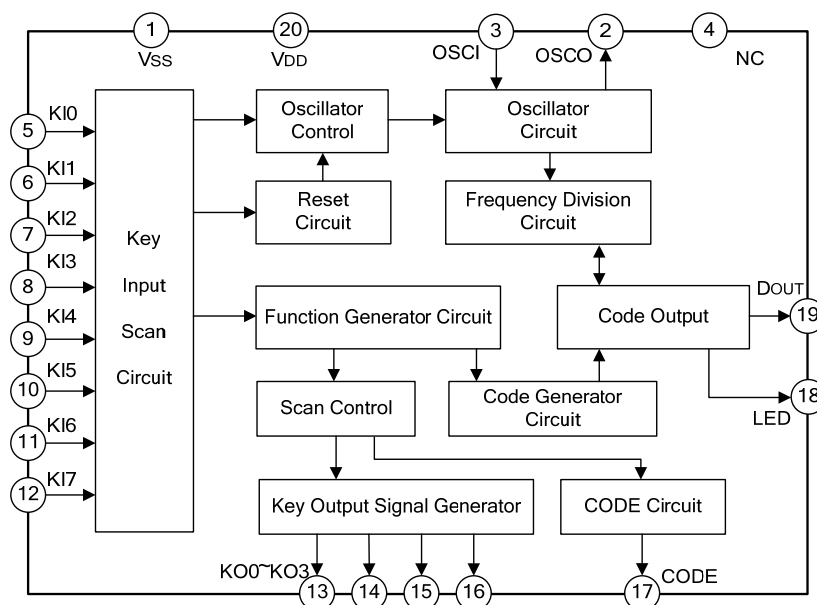
ORDERING INFORMATION

Part No.	Package
SC9243	DIP-20-300-2.54
SC9243S	SOP-20-375-1.27

APPLICATIONS

- * Mini COMPO
- * Video Cassette Recorder(VCR)
- * CD-Player
- * Audio Equipment

BLOCK DIAGRAM



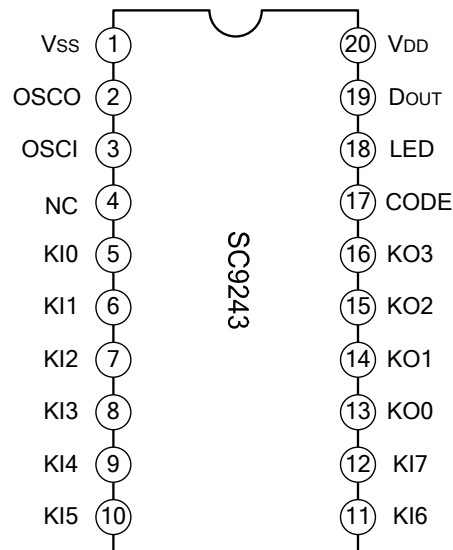
ABSOLUTE MAXIMUM RATING ($T_{amb} \Rightarrow 25^{\circ}\text{C}$)

Characteristics	Symbol	Test conditions	Ratings	Unit
Supply Voltage	VDD		-0.3 ~ 5.0	V
Input Voltage With Respect To Vss	VIN	VDD=3 V All outputs floating	VSS-0.3 ~ VDD+0.3	V
Power Dissipation	Pd		300	mW
Storage Temperature	Tstg		-40~125	$^{\circ}\text{C}$
Operating Temperature	Topr	VDD=3 V	-20~70	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS ($T_{amb}=25^{\circ}\text{C}$, VDD=3V)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Operating supply Voltage	VDD	All Function Operating	2.0	3.0	4.0	V
Operating Supply Current	IDD	Key On Without Load fosc=455 kHz			1000	μA
Stand-By Current	ISB	All Keys Off Stops Oscillation Output Floating.			1	μA
Input Leakage Current(KI0~KI7)	IIL	VIN=GND			1.0	μA
Dout Driving Current	IOH	VDD =3V Vo =1.5V	10			mA
LED Sinking Current	IOL	VDD =3V Vo =1.5V	-5			mA
Input High Level Voltage	VIH		0.7 VDD		VDD	V
Input Low Level Voltage	VIL		0		0.3 VDD	V
Oscillation Frequency	fosc		400	455	800	kHz
Pull-down Resistor	Rd	KI0~KI7 Pins	40	50	60	k Ω

PIN CONFIGURATION



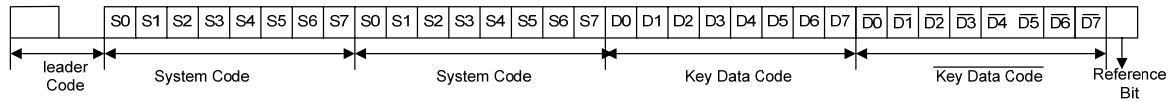
PIN DESCRIPTION

Pin No.	Symbol	Description
1	VSS	Negative Power Supply
2	OSCO	Oscillator Output Pin with Built-in Amplifier Circuit and Feedback Resistor
3	OSCI	Oscillator Input Pin with Built-in Amplifier Circuit and Feedback Resistor
4	NC	not connected
5~12	KI0~KI7	Key Matrix Input Pins. built-in pull-down resistor(80kΩ)
13~16	KO0~KO3	Key Scan Output Pins.
17	CODE	Code Scan Output Pin.
18	LED	Transmission Display Output Pin
19	DOUT	Infrared LED Driving Output Pin
20	VDD	Positive Power Supply

FUNCTIONAL DESCRIPTION

1. TRANSMISSION CODE

The transmission code consists of a leader code, 16 bits system code, and 8 bits data code. The inverse of the data code is also sent simultaneously. The following diagram shows this one frame construction.



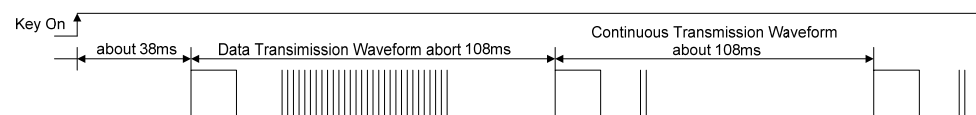
It should be noted that System Code Bit 7(S7) has a fixed value of “1”.

The leader code consists of a 4.5 ms carrier waveform followed by a 4.5 ms OFF waveform. It is used as the leader for the following codes. Thus, when reception is configured by a microcomputer, the time relationship between the detection of the reception and the other processes can be managed efficiently. The code uses the PPM (Pulse Position Modulation) Method, with “0” and “1” differentiated by the time between pulses.

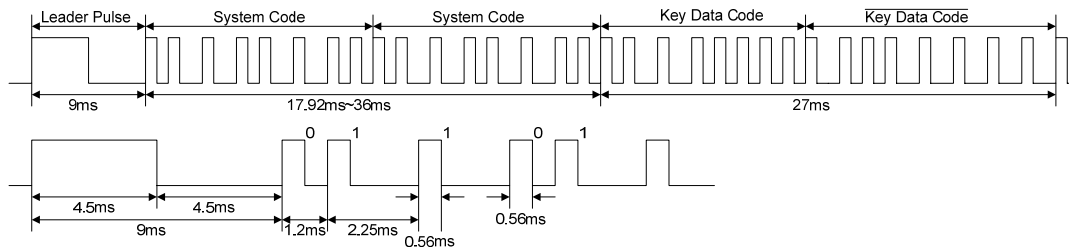
2. REMOTE OUTPUT WAVEFORMS

SC9243 Remote Output Waveforms are given in the diagram below.(for fosc=455KHz)

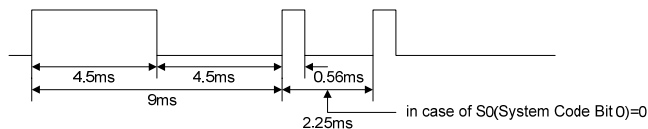
DOUT Output Waveform



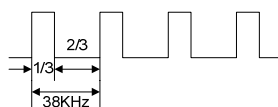
Data Transmission Waveform



Continuous Transmission Waveform



Carrier Waveform



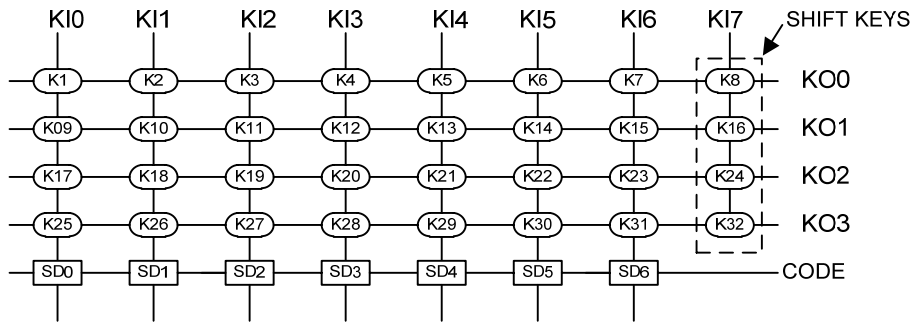
When oscillation frequency is 455 KHz, a signal is outputted after pulse is modulated by 38 KHz of duty 1/3 (which is 1/12 of the carrier generation circuit).

Note: In preparing the firmware of the receiving circuit, please strictly follow the following instructions:

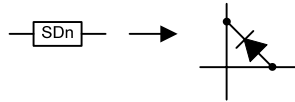
1. System Codes: The same code is transmitted twice and therefore, always decode these 2 codes and check if they are in agreement with each other.
2. Key Data Codes: The Key Data Code and its inversed code are always transmitted together, therefore, check if they are in agreement with each other.

3. KEY MATRIX

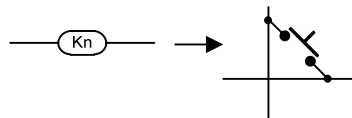
SC9243 enables the maximum setting of up to 32 keys through a combination of K10 to K17 and KO0~KO3. Furthermore, the System Codes are settable in 7 bits through the combination of K10~K16 and Code Key. Please refer to the diagram below:



Note:
System Code Diode Jumper



Key Switch

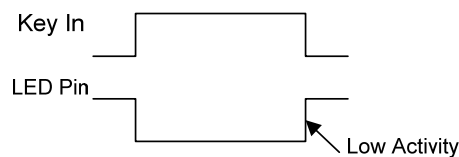


Key Nos.K8,16,24 and 32 (the Shift Keys) can be pressed simultaneously or in any random order with other keys (normal keys).

The system code setting is constructed by connecting the diode jumper between Code Key and K10~K16 keys. With the diode jumper, the system code will have the value of "1". If Code and any one of the K10~K16 keys are connected only at one point, the diode jumper may be disregarded.

4.LED TERMINAL

When there is no key activity, the LED Pin is in the HIGH Level. Please refer to the diagram below.



SC9243 DATA CODE MAP 1 (ONE KEY PRESSED)

Key No.	KO Port	KI Port	D0	D1	D2	D3	D4	D5	D6	D7
K1	KO0	KI0	1	0	0	0	0	0	0	0
K2		KI1	0	1	0	0	0	0	0	0
K3		KI2	1	1	0	0	0	0	0	0
K4		KI3	0	0	1	0	0	0	0	0
K5		KI4	1	0	1	0	0	0	0	0
K6		KI5	0	1	1	0	0	0	0	0
K7		KI6	1	1	1	0	0	0	0	0
K8		KI7	0	0	0	0	0	0	1	0
K9	KO1	KI0	1	0	0	1	0	0	0	0
K10		KI1	0	1	0	1	0	0	0	0
K11		KI2	1	1	0	1	0	0	0	0
K12		KI3	0	0	1	1	0	0	0	0
K13		KI4	1	0	1	1	0	0	0	0
K14		KI5	0	1	1	1	0	0	0	0
K15		KI6	1	1	1	1	0	0	0	0
K16		KI7	0	0	0	0	0	0	1	1
K17	KO2	KI0	1	0	0	0	1	0	0	0
K18		KI1	0	1	0	0	1	0	0	0
K19		KI2	1	1	0	0	1	0	0	0
K20		KI3	0	0	1	0	1	0	0	0
K21		KI4	1	0	1	0	1	0	0	0
K22		KI5	0	1	1	0	1	0	0	0
K23		KI6	1	1	1	0	1	0	0	0
K24		KI7	0	0	0	0	0	0	1	0
K25	KO3	KI0	1	0	0	1	1	0	0	0
K26		KI1	0	1	0	1	1	0	0	0
K27		KI2	1	1	0	1	1	0	0	0
K28		KI3	0	0	1	1	1	0	0	0
K29		KI4	1	0	1	1	1	0	0	0
K30		KI5	0	1	1	1	1	0	0	0
K31		KI6	1	1	1	1	1	0	0	0
K32		KI7	0	0	0	0	0	0	1	1

SC9243 DATA CODE MAP 2 (WHEN SHIFT KEY K8 + OTHER KEYS ARE PRESSED)

Key No.	KO Port	KI Port	D0	D1	D2	D3	D4	D5	D6	D7
K1	KO0	KI0	1	0	0	0	0	1	0	0
K2		KI1	0	1	0	0	0	1	0	0
K3		KI2	1	1	0	0	0	1	0	0
K4		KI3	0	0	1	0	0	1	0	0
K5		KI4	1	0	1	0	0	1	0	0
K6		KI5	0	1	1	0	0	1	0	0
K7		KI6	1	1	1	0	0	1	0	0
K8		KI7								
K9	KO1	KI0	1	0	0	1	0	1	0	0
K10		KI1	0	1	0	1	0	1	0	0
K11		KI2	1	1	0	1	0	1	0	0
K12		KI3	0	0	1	1	0	1	0	0
K13		KI4	1	0	1	1	0	1	0	0
K14		KI5	0	1	1	1	0	1	0	0
K15		KI6	1	1	1	1	0	1	0	0
K16		KI7								
K17	KO2	KI0	1	0	0	0	1	1	0	0
K18		KI1	0	1	0	0	1	1	0	0
K19		KI2	1	1	0	0	1	1	0	0
K20		KI3	0	0	1	0	1	1	0	0
K21		KI4	1	0	1	0	1	1	0	0
K22		KI5	0	1	1	0	1	1	0	0
K23		KI6	1	1	1	0	1	1	0	0
K24		KI7								
K25	KO3	KI0	1	0	0	1	1	1	0	0
K26		KI1	0	1	0	1	1	1	0	0
K27		KI2	1	1	0	1	1	1	0	0
K28		KI3	0	0	1	1	1	1	0	0
K29		KI4	1	0	1	1	1	1	0	0
K30		KI5	0	1	1	1	1	1	0	0
K31		KI6	1	1	1	1	1	1	0	0
K32		KI7								

SC9243 DATA CODE MAP 3 (WHEN SHIFT KEY K16+OTHER KEYS ARE PRESSED)

Key No.	KO Port	KI Port	D0	D1	D2	D3	D4	D5	D6	D7
K1	KO0	KI0	1	0	0	0	0	1	1	0
K2		KI1	0	1	0	0	0	1	1	0
K3		KI2	1	1	0	0	0	1	1	0
K4		KI3	0	0	1	0	0	1	1	0
K5		KI4	1	0	1	0	0	1	1	0
K6		KI5	0	1	1	0	0	1	1	0
K7		KI6	1	1	1	0	0	1	1	0
K8		KI7								
K9	KO1	KI0	1	0	0	1	0	1	1	0
K10		KI1	0	1	0	1	0	1	1	0
K11		KI2	1	1	0	1	0	1	1	0
K12		KI3	0	0	1	1	0	1	1	0
K13		KI4	1	0	1	1	0	1	1	0
K14		KI5	0	1	1	1	0	1	1	0
K15		KI6	1	1	1	1	0	1	1	0
K16		KI7								
K17	KO2	KI0	1	0	0	0	1	1	1	0
K18		KI1	0	1	0	0	1	1	1	0
K19		KI2	1	1	0	0	1	1	1	0
K20		KI3	0	0	1	0	1	1	1	0
K21		KI4	1	0	1	0	1	1	1	0
K22		KI5	0	1	1	0	1	1	1	0
K23		KI6	1	1	1	0	1	1	1	0
K24		KI7								
K25	KO3	KI0	1	0	0	1	1	1	1	0
K26		KI1	0	1	0	1	1	1	1	0
K27		KI2	1	1	0	1	1	1	1	0
K28		KI3	0	0	1	1	1	1	1	0
K29		KI4	1	0	1	1	1	1	1	0
K30		KI5	0	1	1	1	1	1	1	0
K31		KI6	1	1	1	1	1	1	1	0
K32		KI7								

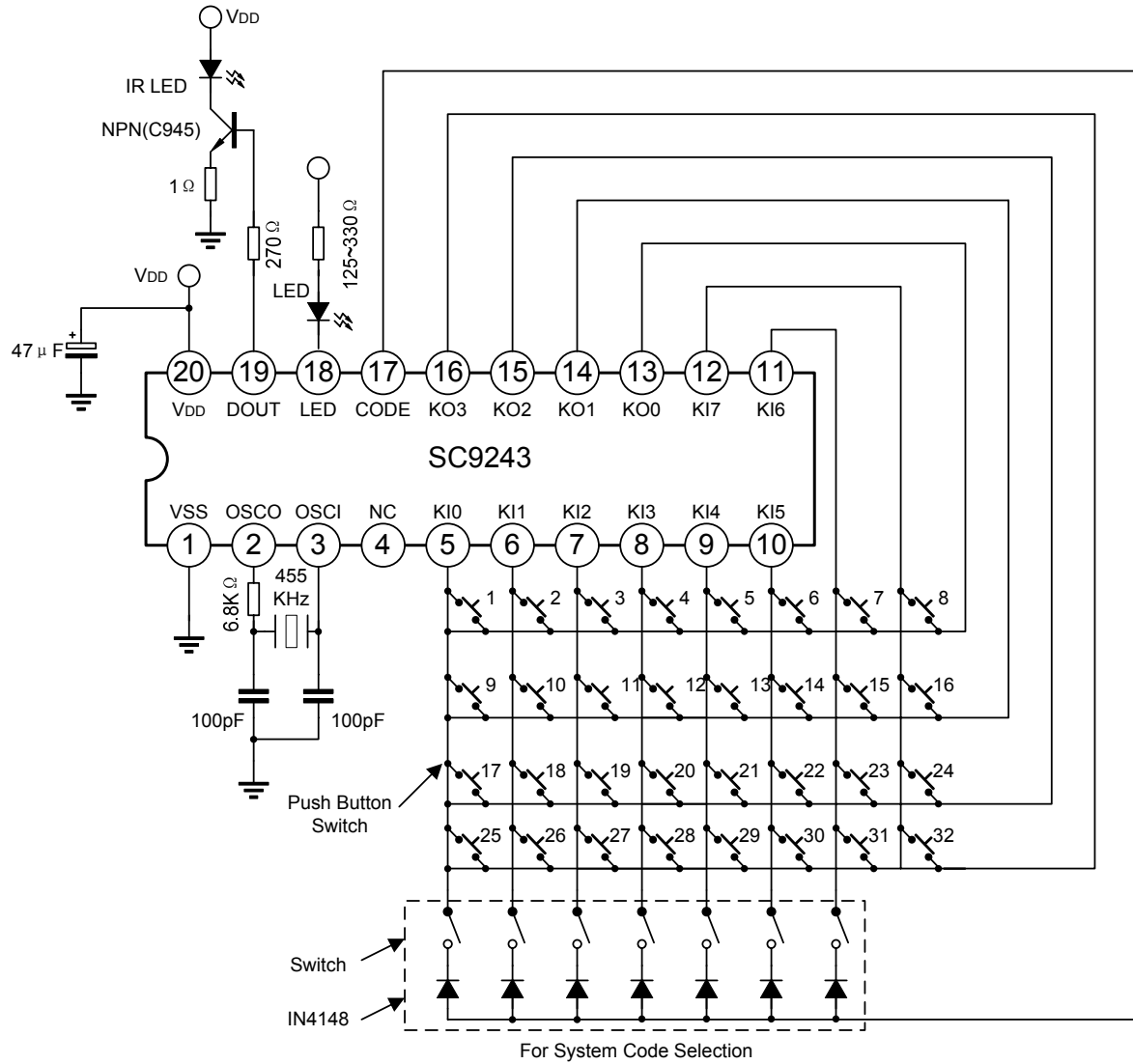
SC9243 DATA CODE MAP 4 (WHEN SHIFT KEY K24+OTHER KEYS ARE PRESSED)

Key No.	KO Port	KI Port	D0	D1	D2	D3	D4	D5	D6	D7
K1	KO0	KI0	1	0	0	0	0	1	0	1
K2		KI1	0	1	0	0	0	1	0	1
K3		KI2	1	1	0	0	0	1	0	1
K4		KI3	0	0	1	0	0	1	0	1
K5		KI4	1	0	1	0	0	1	0	1
K6		KI5	0	1	1	0	0	1	0	1
K7		KI6	1	1	1	0	0	1	0	1
K8		KI7								
K9	KO1	KI0	1	0	0	1	0	1	0	1
K10		KI1	0	1	0	1	0	1	0	1
K11		KI2	1	1	0	1	0	1	0	1
K12		KI3	0	0	1	1	0	1	0	1
K13		KI4	1	0	1	1	0	1	0	1
K14		KI5	0	1	1	1	0	1	0	1
K15		KI6	1	1	1	1	0	1	0	1
K16		KI7								
K17	KO2	KI0	1	0	0	0	1	1	0	1
K18		KI1	0	1	0	0	1	1	0	1
K19		KI2	1	1	0	0	1	1	0	1
K20		KI3	0	0	1	0	1	1	0	1
K21		KI4	1	0	1	0	1	1	0	1
K22		KI5	0	1	1	0	1	1	0	1
K23		KI6	1	1	1	0	1	1	0	1
K24		KI7								
K25	KO3	KI0	1	0	0	1	1	1	0	1
K26		KI1	0	1	0	1	1	1	0	1
K27		KI2	1	1	0	1	1	1	0	1
K28		KI3	0	0	1	1	1	1	0	1
K29		KI4	1	0	1	1	1	1	0	1
K30		KI5	0	1	1	1	1	1	0	1
K31		KI6	1	1	1	1	1	1	0	1
K32		KI7								

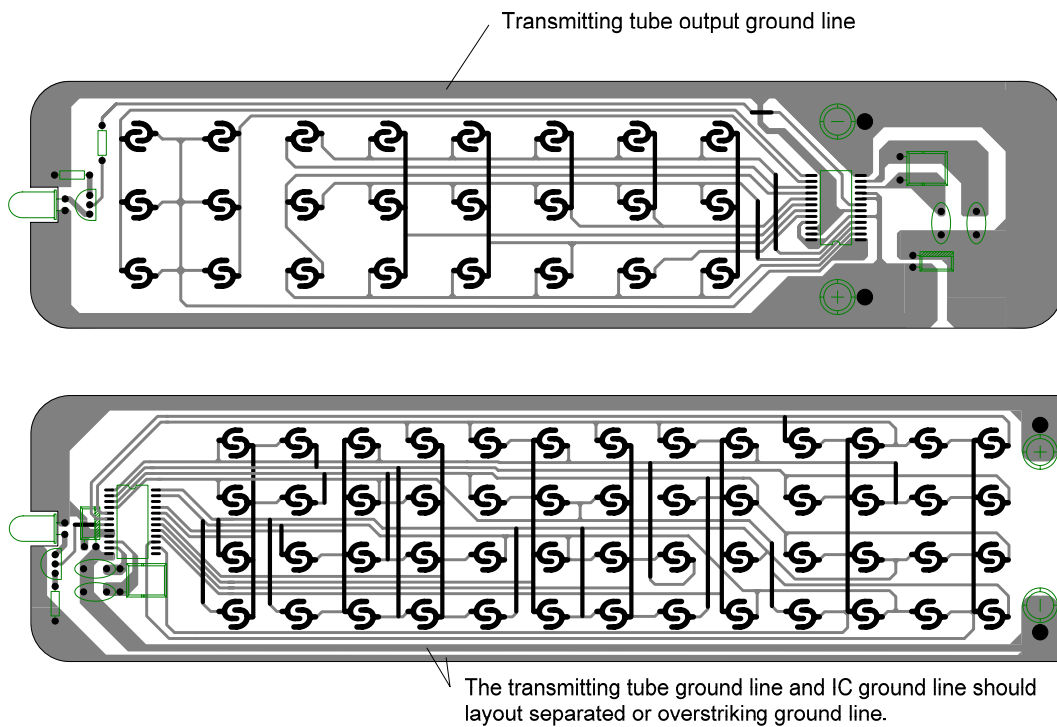
SC9243 DATA CODE MAP 5 (WHEN SHIFT KEY K32+OTHER KEYS ARE PRESSED)

Key No.	KO Port	KI Port	D0	D1	D2	D3	D4	D5	D6	D7
K1	KO0	KI0	1	0	0	0	0	1	1	1
K2		KI1	0	1	0	0	0	1	1	1
K3		KI2	1	1	0	0	0	1	1	1
K4		KI3	0	0	1	0	0	1	1	1
K5		KI4	1	0	1	0	0	1	1	1
K6		KI5	0	1	1	0	0	1	1	1
K7		KI6	1	1	1	0	0	1	1	1
K8		KI7								
K9	KO1	KI0	1	0	0	1	0	1	1	1
K10		KI1	0	1	0	1	0	1	1	1
K11		KI2	1	1	0	1	0	1	1	1
K12		KI3	0	0	1	1	0	1	1	1
K13		KI4	1	0	1	1	0	1	1	1
K14		KI5	0	1	1	1	0	1	1	1
K15		KI6	1	1	1	1	0	1	1	1
K16		KI7								
K17	KO2	KI0	1	0	0	0	1	1	1	1
K18		KI1	0	1	0	0	1	1	1	1
K19		KI2	1	1	0	0	1	1	1	1
K20		KI3	0	0	1	0	1	1	1	1
K21		KI4	1	0	1	0	1	1	1	1
K22		KI5	0	1	1	0	1	1	1	1
K23		KI6	1	1	1	0	1	1	1	1
K24		KI7								
K25	KO3	KI0	1	0	0	1	1	1	1	1
K26		KI1	0	1	0	1	1	1	1	1
K27		KI2	1	1	0	1	1	1	1	1
K28		KI3	0	0	1	1	1	1	1	1
K29		KI4	1	0	1	1	1	1	1	1
K30		KI5	0	1	1	1	1	1	1	1
K31		KI6	1	1	1	1	1	1	1	1
K32		KI7								

TYPICAL APPLICATION CIRCUIT



PCB WIRE LAYOUT SCHEMATIC



The above IC only use to hint, not to specified.

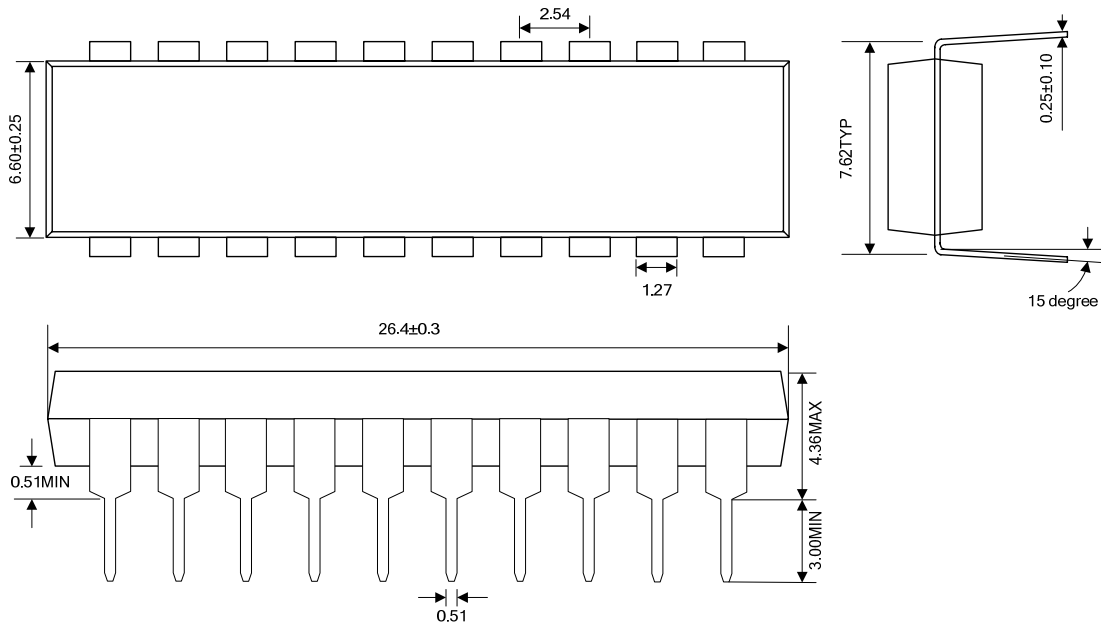
Note:

- * In wire layout, the power filter capacitor should near to IC.
- * In wire layout, should avoid power line and ground line too long.
- * It is recommended to separate power line and ground line for transmit and IC and overstriking.
- * The emitter of triode connect $1\ \Omega$ resistor at least.

PACKAGE OUTLINE

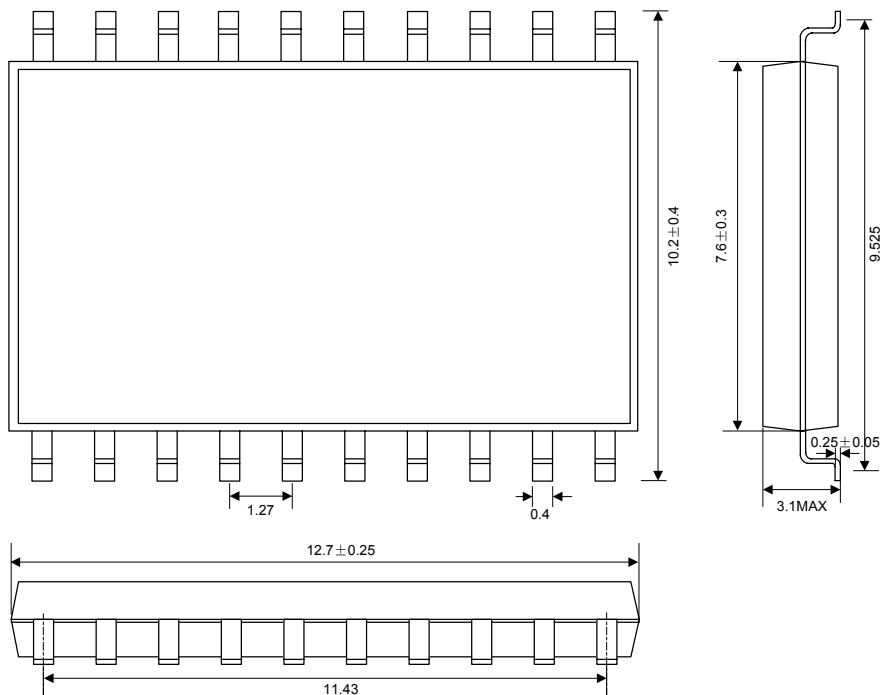
DIP-20-300-2.54

UNIT: mm



SOP-20-375-1.27

UNIT: mm





HANDLING MOS DEVICES:

Electrostatic charges can exist in many things. All of our MOS devices are internally protected against electrostatic discharge but they can be damaged if the following precautions are not taken:

- Persons at a work bench should be earthed via a wrist strap.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed for dispatch in antistatic/conductive containers.

Disclaimer:

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without further notice!
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!

ATTACHMENT**Revision History**

Data	REV	Description	Page
2000.12.31	1.0	Original	
2002.02.28	1.1	Modify the "Absolute maximum rating"	2
		Modify the "Typical application circuit"	11
		Add the "PCB wire layout schematic"	12
		Modify the "Package outline"	13
2009.02.17	1.2	Modify the "block diagram", "pin configuration" and "pin description"	