

SKY3000
Data Sheet

**TRIPLE-TRACK
MAGNETIC STRIPE
F2F DECODER IC**

For More Information

Solution Way Co., Ltd
www.solutionway.com
ydlee@solutionway.com
Tel:+82-31-605-3800
Fax:+82-31-605-3801

Introduction

1. Description.....3

2. Features.....3

3. Block Diagram.....4

4. Pin Configuration.....5

5. Pin Description.....6

6. Electrical Characteristics.....7

7. Functional Description.....8

8. Application Information.....10

9. Package Information.....13

1 DESCRIPTION

SKY3000 is a CMOS Integrated Circuit device, which is providing high functional F2F Decoding and Encoding for Magnetic Card Reader. SKY3000 provides decoding function for magnetic stripe storage system, with all the analog and digital circuits in a single chip. The analog block contains preamplifier, peak detector, comparator and reference generator. The digital block includes reference window signal generator, up/down counter for F2F signal measurement, bit-error detection and control logic.

2 FEATURES

- 2.1. Mixed signal, Application Specific IC
- 2.2. Compact, standard IC package, SSOP-24 & QFN 24 LD.
- 2.3. Low cost solution by reduced external components
- 2.4. Easily decodes standard 75 & 210 BPI decoding for used cards
- 2.5. Wide range of card swipe speed : 300 ~12600 BPS
- 2.6. Automatic Gain Control for wide magnetic signal ranges
- 2.7. 25% bit to bit jitter compensation
- 2.8. Automatic resetting against noise
- 2.9. Built in Power-on-Reset & Oscillator
- 2.10. Low power consumption (Operating: 2mA, Standby: under 1mA @ 3.3V)
- 2.11. Wide operating voltage: VDD =3.0V~5.5V
- 2.12. Operating temperature range: Ta = -35°C ~ +75°C
- 2.13. High immunity to ambient noise including TDMA noise
- 2.14 ± 2000V Electro-Static Discharge (ESD) protection

3 BLOCK DIAGRAM

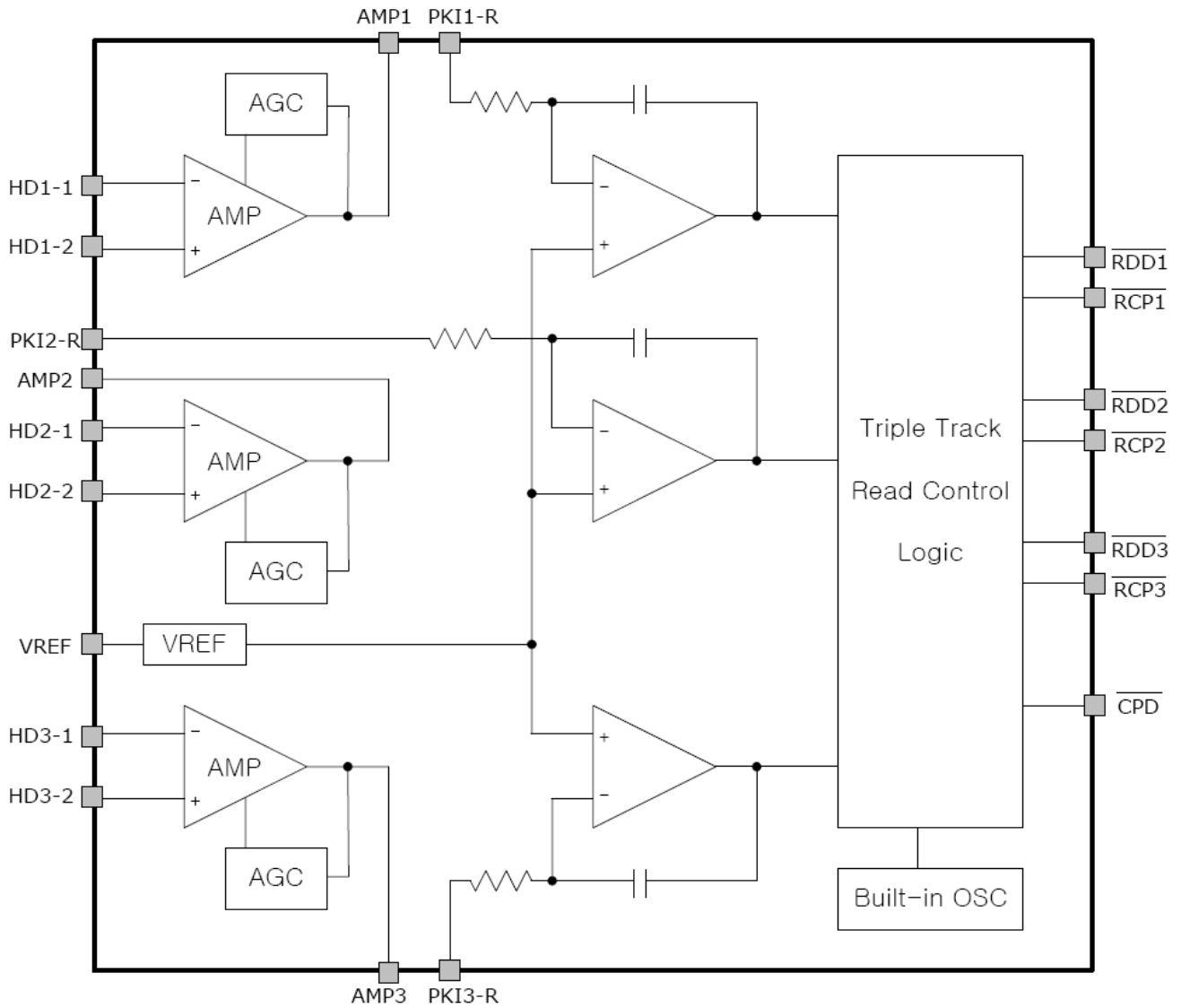


Figure - 1 Architectural Block Diagram

4 PIN CONFIGURATION

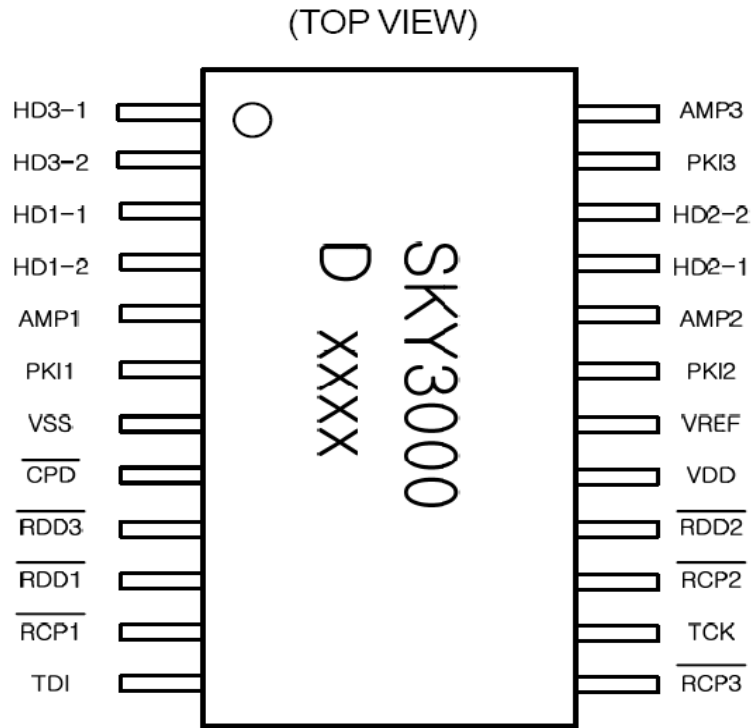


Figure – 2.1 Pin Configuration (24 SSOP)

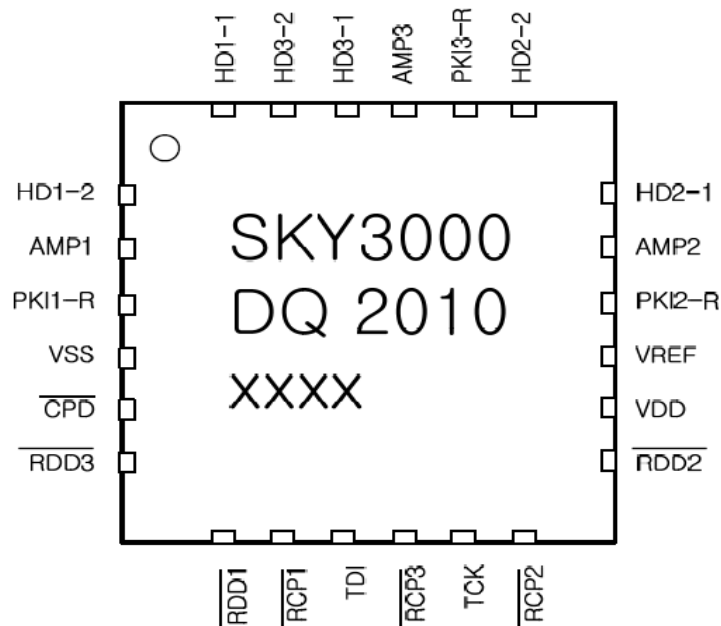


Figure – 2.2 Pin Configuration (24 QFN)

5 PIN DESCRIPTION

Pin No.	Pin No.	Symbol	Name	Description
SSOP	QFN			
1	22	HD ₃₋₁	Amplifier (-) input	The magnetic head is connected between HD ₃₋₁ and HD ₃₋₂
2	23	HD ₃₋₂	Amplifier (+) input	The magnetic head is connected between HD ₃₋₁ and HD ₃₋₂
3	24	HD ₁₋₁	Amplifier (-) input	The magnetic head is connected between HD ₁₋₁ and HD ₁₋₂
4	1	HD ₁₋₂	Amplifier (+) input	The magnetic head is connected between HD ₁₋₁ and HD ₁₋₂
5	2	AMP1	Amplifier Output 1	Amplifier Output 1
6	3	PKI1	Peak Detect Input 1	Peak Detect Input 1
7	4	VSS	Ground	Power Supply ground pin
8	5	$\overline{\text{CPD}}$	Card present detect	Signal output to indicate a running card
9	6	$\overline{\text{RDD3}}$	Read data output(3)	Data output after F2F demodulation
10	7	$\overline{\text{RDD1}}$	Read data output(1)	Data output after F2F demodulation
11	8	$\overline{\text{RCP1}}$	Read clock output(1)	Clock pulse output after F2F demodulation
12	9	TDI	Test data in	F2F signal in when test mode
13	10	$\overline{\text{RCP3}}$	Read clock output(3)	Clock pulse output after F2F demodulation
14	11	TCK	Test clock	External Clock_in when test mode
15	12	$\overline{\text{RCP2}}$	Read clock output(2)	Clock pulse output after F2F demodulation
16	13	$\overline{\text{RDD2}}$	Read data output(2)	Data output after F2F demodulation
17	14	$\overline{\text{VDD}}$	Power supply	Power Supply VDD pin
18	15	V _{REF}	Reference voltage input	Reference voltage input
19	16	PKI2	Peak Detect Input 2	Peak Detect Input 2
20	17	AMP2	Amplifier Output 2	Amplifier Output 2
21	18	HD ₂₋₁	Amplifier (-) input	The magnetic head is connected between HD ₂₋₁ and HD ₂₋₂
22	19	HD ₂₋₂	Amplifier (+) input	The magnetic head is connected between HD ₂₋₁ and HD ₂₋₂
23	20	PKI3	Peak Detect Input 3	Peak Detect Input 3
24	21	AMP3	Amplifier Output 3	Amplifier Output 3

6 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (Non-Operating)

DC Supply Voltage	0 to 7 Volt
Voltage Input Range	0 to VDD
Input Current	20 mA
Output Current	10 mA
Storage Temperature Range	-55°C ~ +150°C
Lead Temperature	260°C

Recommended Operating Conditions

Characteristics	Symbol	Condition	Min	Typ	Max	Unit
Operating Voltage	V _{DD}		3.0		5.5	V
Operating Temperature	T _{OPR}		-35		+75	°C
Reference Voltage	V _{REF}			VDD/2		V
Oscillator Frequency	Osc	V _{DD} =5.0V	1.6	2.0	2.5	MHz
Output Voltage /RDD,/RCP,/CPD	V _{OH}	V _{DD} =5.0V I _{OH} =10mA	4.5			V
		V _{DD} =3.3V I _{OH} =8mA	2.5			V
	V _{OL}	V _{DD} =5.0V I _{OL} =10mA			0.4	V
		V _{DD} =3.3V I _{OL} =6mA			0.4	V
Operating Current	I _{DD}	V _{DD} =5.0V		2.0		mA
		V _{DD} =3.3V		1.4		mA
Standby Current	I _{STBY}	V _{DD} =5.0V		1.2		mA
		V _{DD} =3.3V		0.9		mA

7 FUNCTIONAL DESCRIPTION

SKY3000 provides decoding function for magnetic stripe storage system, with all the analog and digital circuits in a single chip. F2F pattern signal is generated by analog signal processing through an amplifier OP1, peak detector OP2 and comparator. The operation of digital logic for data generation is activated by triggering oscillation circuit as soon as detecting F2F pattern transition. Card Present Detect (CPD) signal becomes active state after null 8 bits from the first bit reading. And also proper RDD and RCP signals are generated.

SIGNAL DESCRIPTION

- READ DATA ($\overline{\text{RDD}}$)

The Data signal is valid while the $\overline{\text{RCP}}$ is low. If $\overline{\text{RDD}}$ signal is high, the logical value of the bit is zero(0). If low, then the logical value of the bit is high(1). Data output is a serial stream of digital bits, the level of which, with the corresponding clock, represents each data bit that was recorded on the magnetic stripe track. No data filtering is required, as the first 8 to 9 bits (after wake-up) from the leading edge of a magnetic stripe are not provided as output, as these bits are used for circuit synchronization.

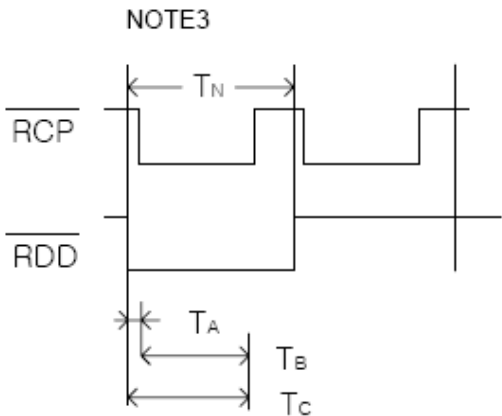
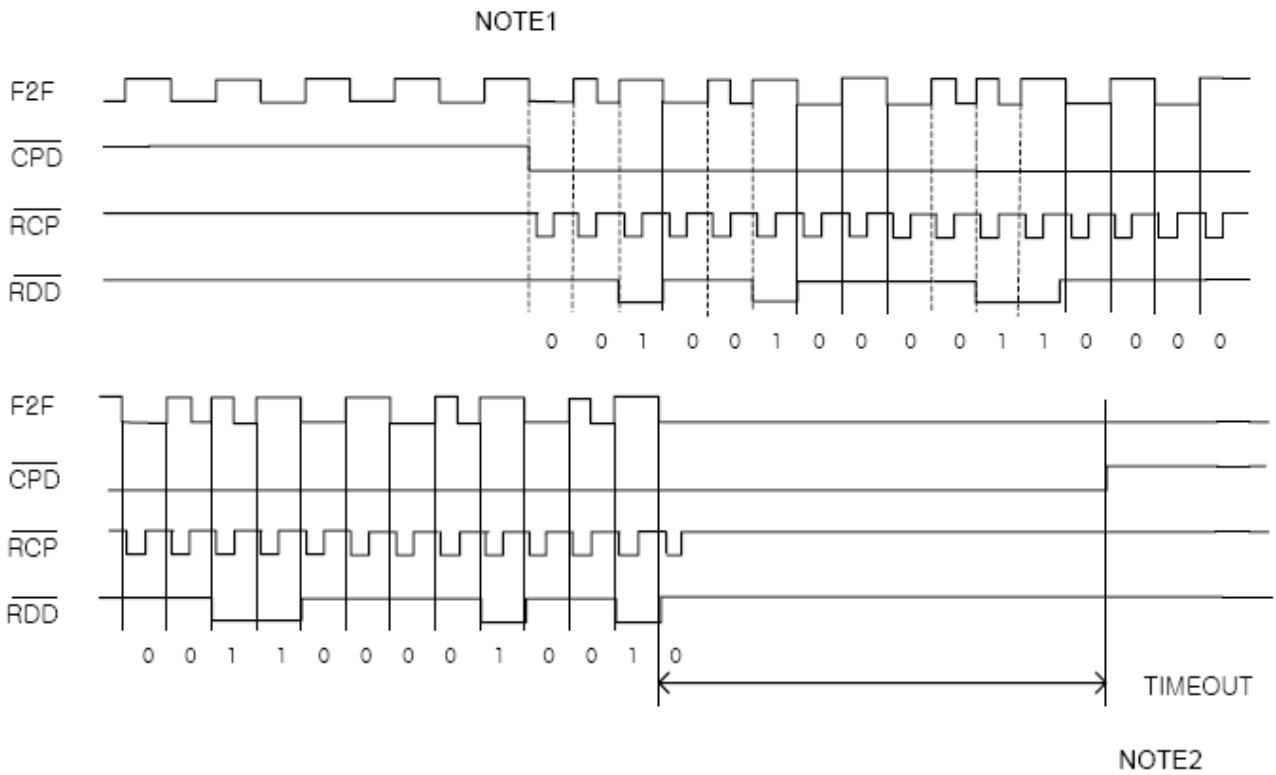
- READ CLOCK ($\overline{\text{RCP}}$)

The $\overline{\text{RCP}}$ signal indicates that $\overline{\text{RDD}}$ is valid. The $\overline{\text{RDD}}$ should be loaded and stable before the $\overline{\text{RCP}}$ signal goes low (negative edge). Clocking output is normally high, and goes low to indicate a data sample time. The data output is stable and may be sampled on the falling or rising edge of clock, or at any time while the clock is low. The $\overline{\text{RCP}}$ goes low approximately 3.2 μsec after the data output is valid. The receiving interface for data must sense the high-to-low clock transition and acquire the data bit level during clock pulse. The clock width changes with speed.

- CARD PRESENT ($\overline{\text{CPD}}$)

Card Present Detect signal goes low after the 8 or 9th flux reversal, and it returns to high when approx. 10ms was elapsed. When no card is being inserted through magnetic reader system, the $\overline{\text{RDD}}$, $\overline{\text{RCP}}$, and $\overline{\text{CPD}}$ signals stay high. This signal is normally high; a low output indicates encoded media. The output is an open drain type with internal pull-up resistor; the outputs of several circuits can be connected together. An external pull-up resistor is not needed.

TIMING DIAGRAM



NOTE4

T_A	$8 T_{osc}$
T_B	$(5/7 \times T_N) - T_A$
T_C	$5/7 \times T_N$

Figure – 3 Data Read Timing

NOTE:

1. 8 or 9 head flux reversal for low density configuration.
2. TIMEOUT of the \overline{CPD} signal occurs approx. 10 ms after last Head Signal transition.
3. The low pulse width of \overline{RCP} is approx. 70% of bit time.
4. The \overline{RDD} is valid at $8 T_{OSC}$ (3.2 μ s min.) before the negative edge of the \overline{RCP} .

8 APPLICATION INFORMATION

The Magnetic head should be used to be in accordance with SKY3000. Each best suggested circuitry is shown in below. We can also provide other best-suggested circuitry according to different magnetic head.

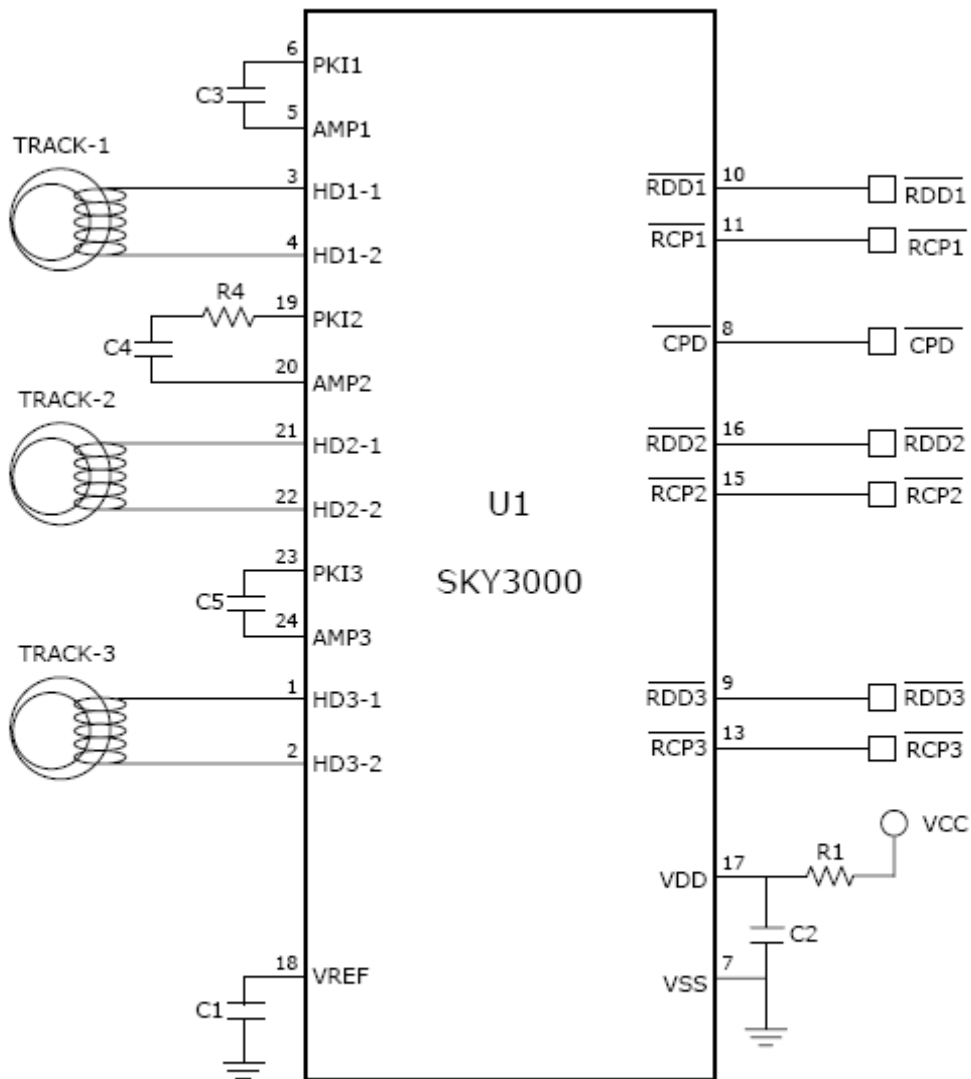


Figure – 4.1 Triple Track (24LD SSOP)

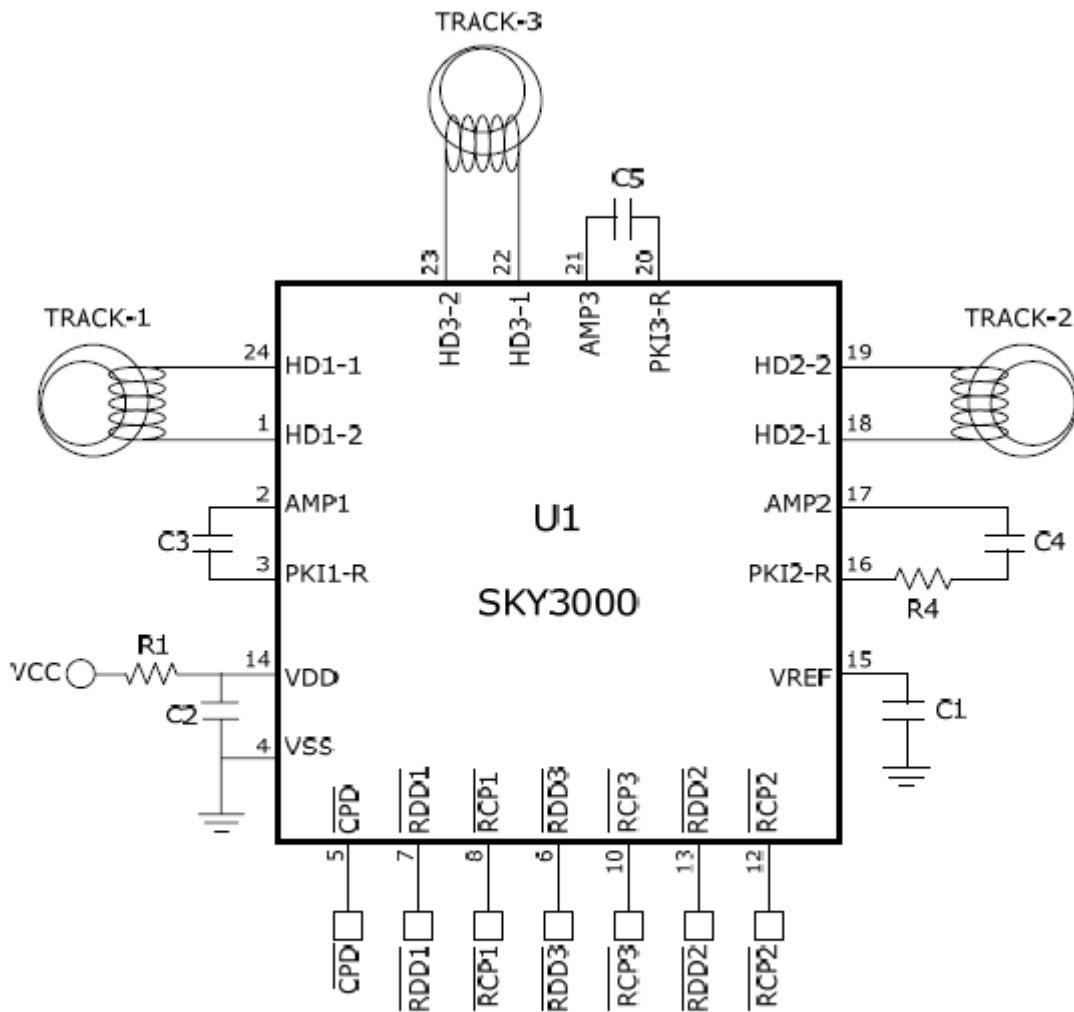


Figure – 4.2 Triple Track (24LD 4X4 QFN)

Recommended component values

PART	75BPI(ISO-2)	210BPI(ISO-1/3)	REMARK
C3		1.0nF	
C4	1.5nF		
C5		1.0nF	
R4	24 KΩ		
C1		0.1 μF	VREF
C2		0.1 μF	
R1		4.7Ω	Optional

The above schematics and part values are provided only for reference.
(140Ω/28mH Magnetic Head)

External Component Parameters

Component	Function	Value	Tolerance	Unit
Capacitor	Required Decoupling capacitance	0.1	± 20 %	uF
Head Inductance	Head Inductance(per track)	28	± 10%	mH
		80		
Head Resistance	Head Inductance(per track)	140	± 10%	Ohm
		200		

PCB Layout Information

The PCB layout should keep the head input signals lines as short as possible and separated from the digital outputs to minimize external noise pick-up and digital to analog crosstalk. Pin 1 is denoted with a dot in the package corner next to pin 1.

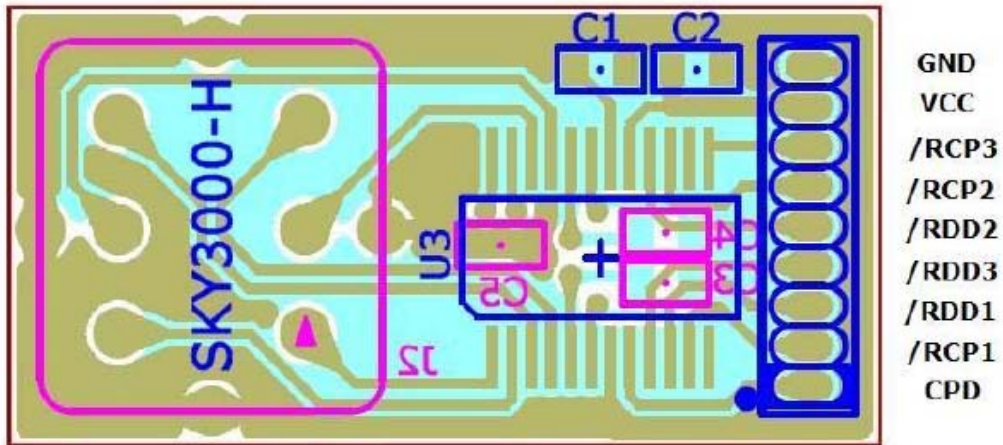


Figure – 5 Triple Track PCB example

9 PACKAGE DIMENSION

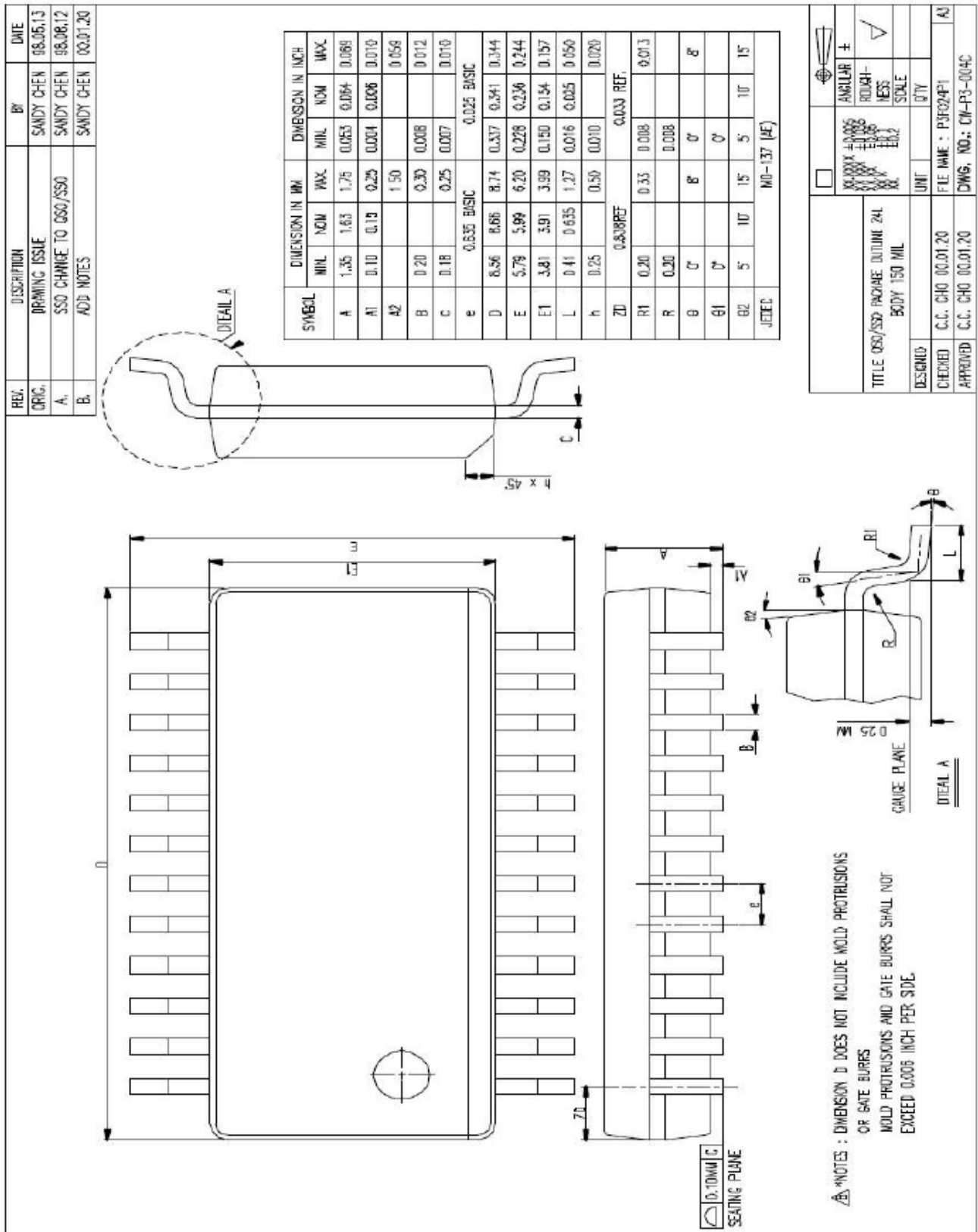
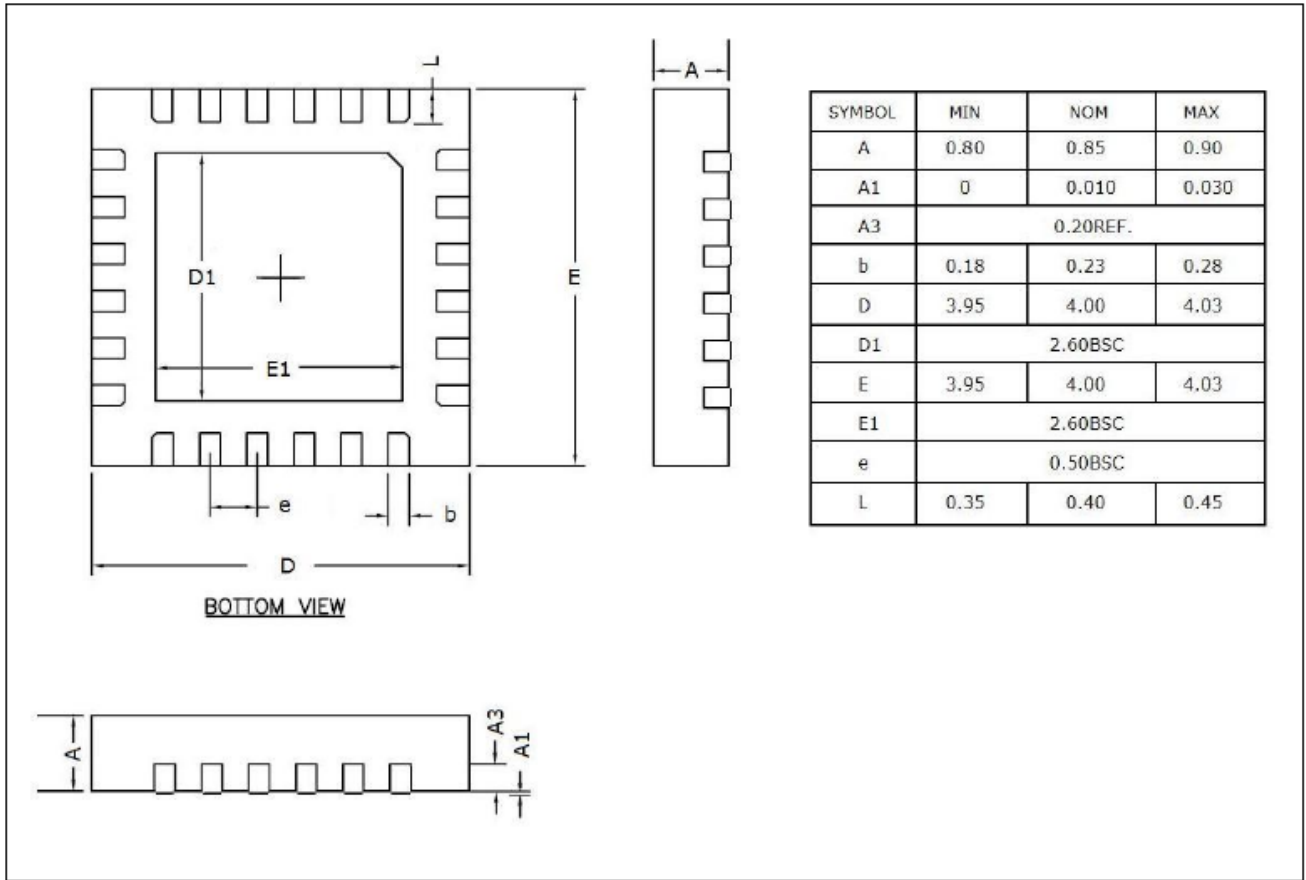


Figure – 6.1 24LD SSOP dimension



ALL DIMENSION ARE IN MILLIMETERS

Figure – 6.2 24LD 4x4 QFN dimension