M3-2300 QFP *Triple Track F/2F Decoder*

Feature

- Triple track F/2F decoder
- Data processing rate: 300 ~ 15,000 bps per track
- Lower Power requirement: DC 3.3 ~ 5.0 V
- Acceptable amplitude from 10% to 200% of ISO reference voltage
- CMOS machining
- RoHS compliant, halogen-free mold compound, JEDEC Pb-Free category e3 compliant (100%Sn solder plating), and 260 ℃ IR reflow test pass

Description

The ***M3-2300 QFP*** F/2F decoder integrated circuit is designed for use in magnetic strip card reader system.

The F/2F read/decoder IC will recover clock and data signals from an F/2F data stream generated from a magnetic head. ***M3-2300 QFP*** will function for data rates from 300 to 15,000 bits per second. Acquisition and tracking of the data within this range is automatically.

M3-2300 QFP is consisted by two major blocks at each channel.

Amplify block-

This block amplifies and filters the signal read from the magnetic reader head, rejects common mode noise and detects signal peaks. It also includes protection circuit to protect the component.

And latches onto the data rate and performs the recovery of individual bits from the F/2F data stream.

Control block-

The enable and disable counters provide initialization for the recovery block. These counters initialize both bit recovery and the signal conditioning and detection block.

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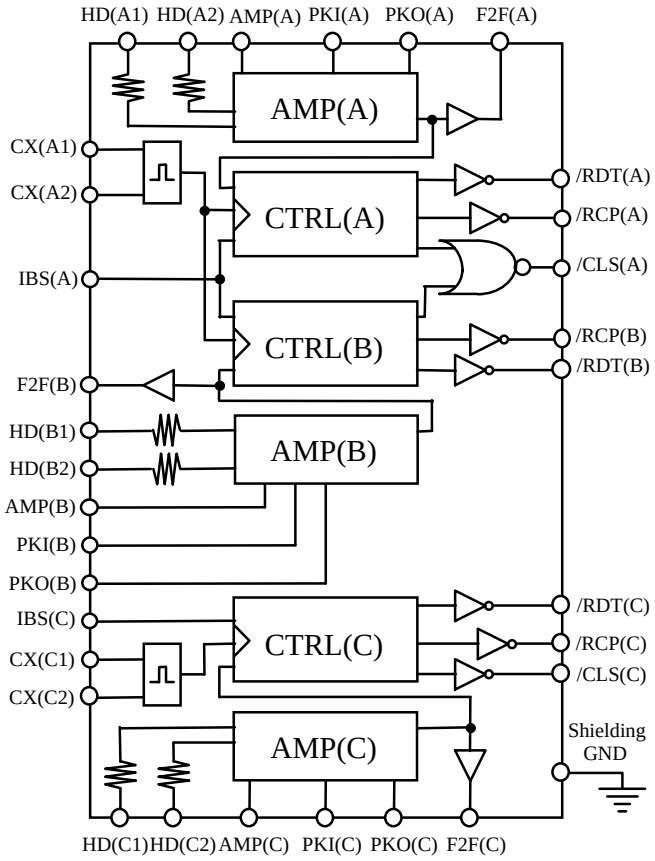
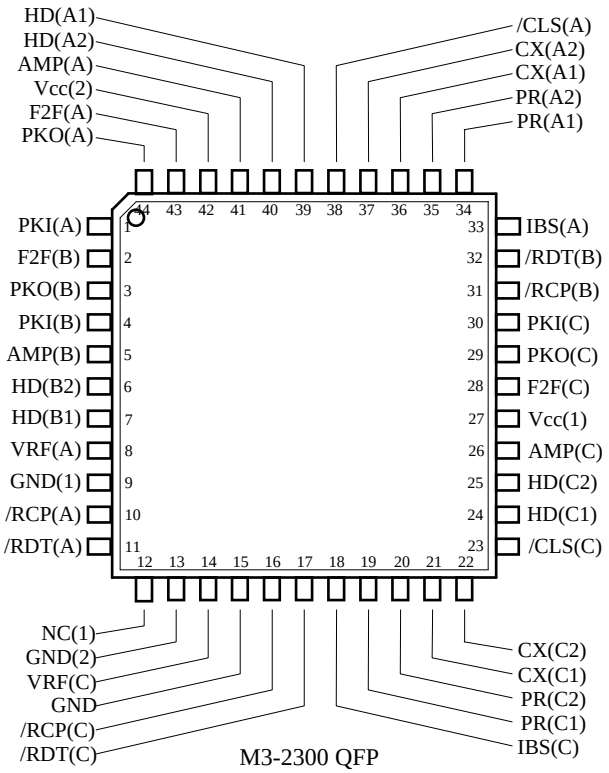
Functional block diagram



M3-2300 QFP

Pin assignment



M3-2300 QFP

Pin description

F2F(A/B/C)	Internal test point
PKO(A/B/C)	Peak detector output
PKI(A/B/C)	Peak detector input
AMP(A/B/C)	Amplifier output
HD(A1/2,B1/2,C1/2)	Amplifier input
VRF(A/C)	Reference voltage output
GND,GND(1/2)	Ground
IBS(A/C)	Ignore bit select
/CLS(A/C)	Card loading signal output
/RDT(A/B/C)	Read data output
/RCP(A/B/C)	Read clock output
CX(A1/C1)	Capacitance for oscillation
CX(A2/C2)	Capacitance for oscillation
PR(A1/C1)	Internal test point
PR(A2/C2)	Internal test point
Vcc(1/2)	Power supply
NC(1)	Non connect

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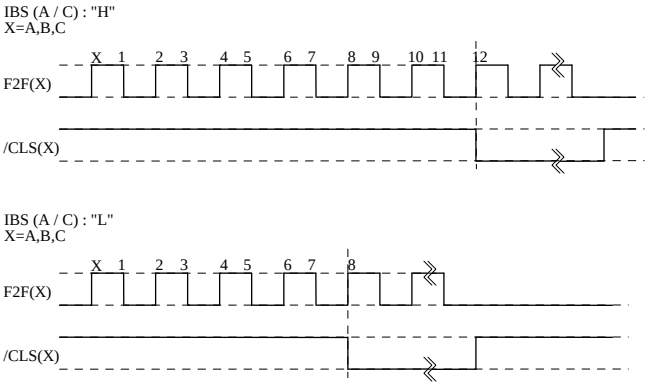
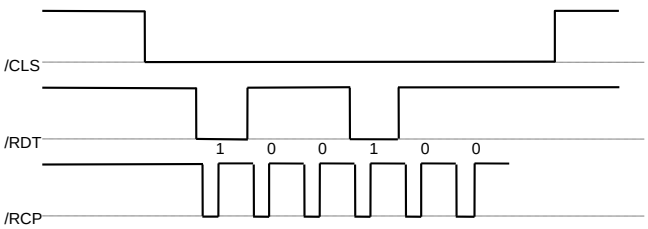
Setting and timing of ignore bits by IBS

IBS(A/C)	NO. of Ignore bits
L	8
H	12
Description	
•CLS output goes “L” after counting the flux changes FC(F/2F status change) of the number of ignore bits, and goes back “H” when bit internal counter is in full count state.	



Timing



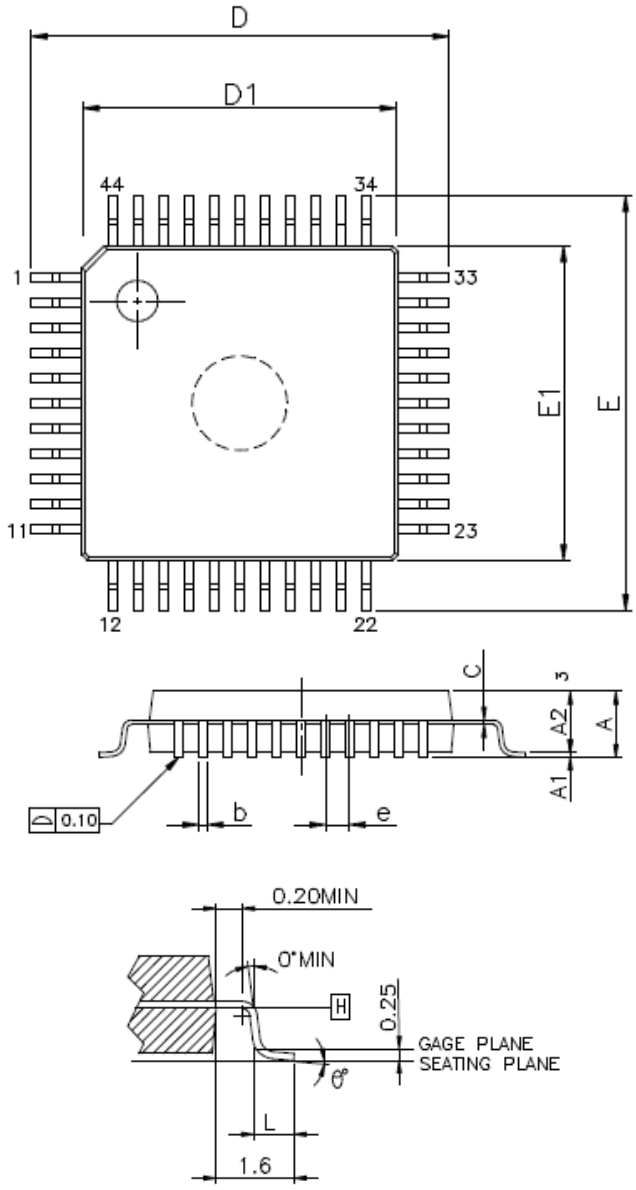
MSL/ESD Rating

1. **MSL Rating**: Level 3
   MSL Standard: IPC/JEDEC J-STD-020
   Packing Standard: IPC/JEDEC J-STD-033
   *Must bake @ 125°C 10 hours before SMT.

Test: HUMAN BODY MODE (HBM)
ESD Standard: MIL-STD-883G
ESD Rating: Class 1B (ESD Sensitive Device!)
Value: Passes between 500 and 999V

Test: MACHINE MODE (MM)
ESD Standard: JEDEC EIA/JESD22-A115
ESD Rating: Class A (ESD Sensitive Device!)
Value: Passes between 50 and 100V

Package outline



SYMBOLS	MIN.	NOM	MAX.
A	–	–	2.70
A1	0.25	–	0.50
A2	1.80	2.00	2.20
①② b (w/o plating)	0.25	0.30	0.35
D	13.00	13.20	13.40
D1	9.9	10.00	10.10
E	13.00	13.20	13.40
E1	9.9	10.00	10.10
L	0.73	0.88	0.93
e		0.80 BSC.	
θ°	0	–	7
C	0.1	0.15	0.2

UNIT : mm

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Electrical characteristics (1) 5V

NO.	Symbol	Parameter		Test Condition	Test ckt.	Min.	Typ.	Max.	Unit
1	V_{REF}	Reference voltage	VRF(A/B/C)	V_{IN}=0mVp-p	1	—	1.7	—	V
2	I_{CCW}	Standby circuit current	Vcc1+Vcc2	V_{IN}=0mVp-p	1	3.5	—	7.0	mA
3	F_{OSC}	Oscillating frequency	/RCP(A/B/C)	C_{OSC}=33pF	1	—	1	—	MHz
4	V_{OH}	“H” Output t voltage	/RDT(A/B/C), /RCP(A/B/C)	Vcc=5V,I_{OH}=-1mA	2	—	4.8	—	V
5	GV_1	Voltage gain 1 of OP amp	AMP(A/B/C)	V_{IN}=50mVp-p,F_{IN}=1KHz, Sine wave	3	—	10	—	V/V
6	GV_2	Voltage gain 2 of OP amp	AMP(A/B/C)	V_{IN}=50mVp-p,F_{IN}=15KHz, Sine wave	3	—	10	—	V/V
7	V_{OPP}	Maximum output voltage of amp	AMP(A/B/C)	F_{IN}=1KHz,Sine wave	3	—	3.4	—	V
8	V_{TH+1}	Positive threshold voltage	PKI(A/B/C)~ F2F(A/B/C)		4	—	0.3	—	V
9	V_{TH-1}	Negative threshold voltage	PKI(A/B/C)~ F2F(A/B/C)		4	—	-0.3	—	V
10	V_{OL2}	“L” Output voltage of F2F	F2F(A/B/C)	V_{PKI}=0V,I_{F2F}=0.5mA	4	—	57	—	mV
11	V_{OH2}	“H” Output voltage of F2F	F2F(A/B/C)	V_{PKI}=5V,I_{F2F}=-0.5mA	4	—	3.1	—	V
12	I_{OH}	“H” Output current	RDT(A/B/C)	Vcc=5V,V_{OH}=2.4V	5	—	22.6	—	mA
13			/RCP(A/B/C), /RDT(A/B/C)			—	-8	—	mA
14	I_{OL}	“L” Output current	RDT(A/B/C)	Vcc=5V,V_{OL}=0.4V	5	—	6.6	—	mA
15			/RCP(A/B/C), /RDT(A/B/C)		5	—	-8.5	—	mA
16	I_{OS}	Output short current	/RCP(A/B/C), /RDT(A/B/C)	Vcc=5V	5	—	-9	—	mA
17	T_R	Rise time	/RCP(A/B/C)	f=1KHz,V_{DC}=0V,Vp-p=5V	6	—	30	—	ns
18	T_F	Fall time	/RCP(A/B/C)	f=1KHz,V_{DE}=0V,Vp-p=5V	6	—	5.7	—	ns

TA=25°C,Vcc=5V
Condition：C_{OSC}=33 pF, RP1=4.7M, RP2=10K, RP3=1K, CP1=47P, CP2=2200P, C_{NF}=150P, C_{VRF}=0.1U

Electrical characteristics (2) 3.3V

NO.	Symbol	Parameter		Test Condition	Test ckt.	Min.	Typ.	Max.	Unit
1	I_{CCW}	Standby circuit current	Vcc1+Vcc2	V_{IN}=0mVp-p	1	1.5	—	3.5	mA

TA=25°C,Vcc=3.3V
Condition：C_{OSC}=33 pF, RP1=4.7M, RP2=10K, RP3=1K, CP1=47P, CP2=2200P, C_{NF}=150P, C_{VRF}=0.1U

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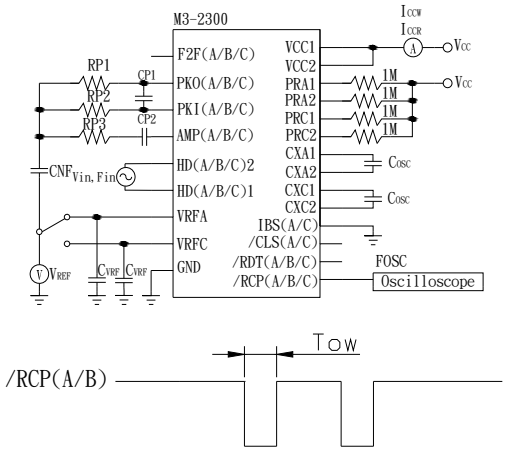
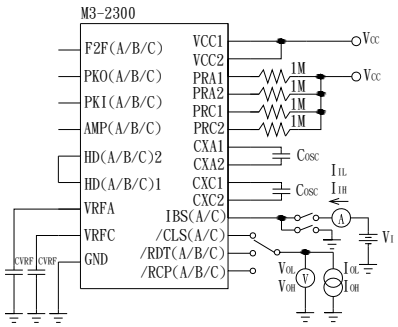
Test Circuits

1. Measurement of V_{REF}, I_{CCW}, I_{CCR}, F_{OSC}

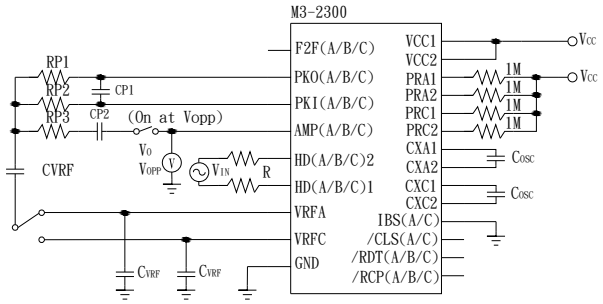


2. Measurement of V_{OL}, V_{OH}, I_{IL}, I_{IH}



Note: Short IBS to GND when it is not measured.

3. Measurement of GV_1, GV_2, R_{IN}, Vopp

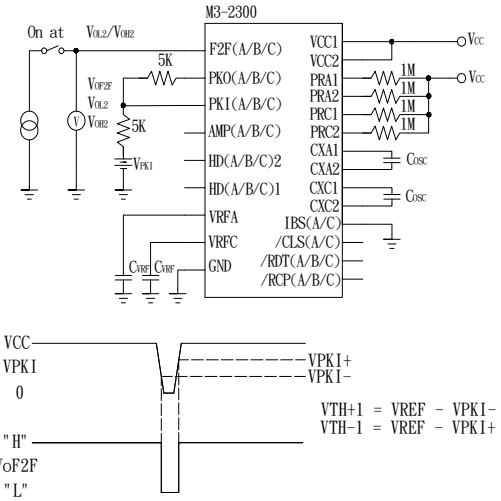


$$GV_1 = \frac{Vo}{Vin}$$

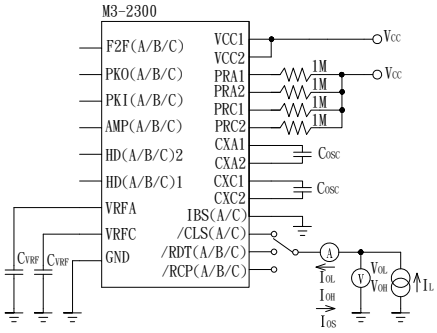
$$R_{IN} = \frac{2Vo}{GV_1 \bullet Vin - Vo} \bullet R$$

Note: R=0KΩ at measuring GV,
R=10KΩ at measuring R_{IN}

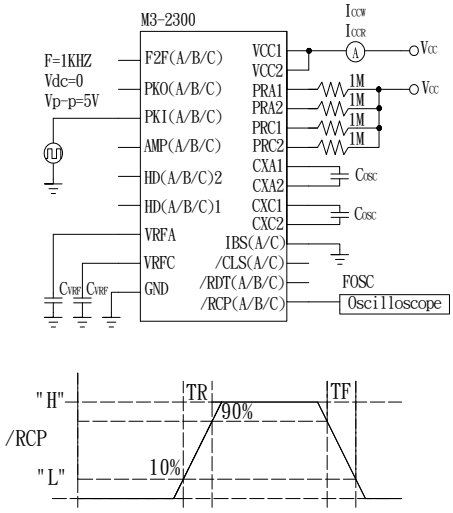
4. Measurement of V_{TH+1}, V_{TH-1}, V_{OL2}, V_{OH2}



5. Measurement of I_{OH}, I_{OL}, I_{OS}



6. Measurement of T_R, T_F



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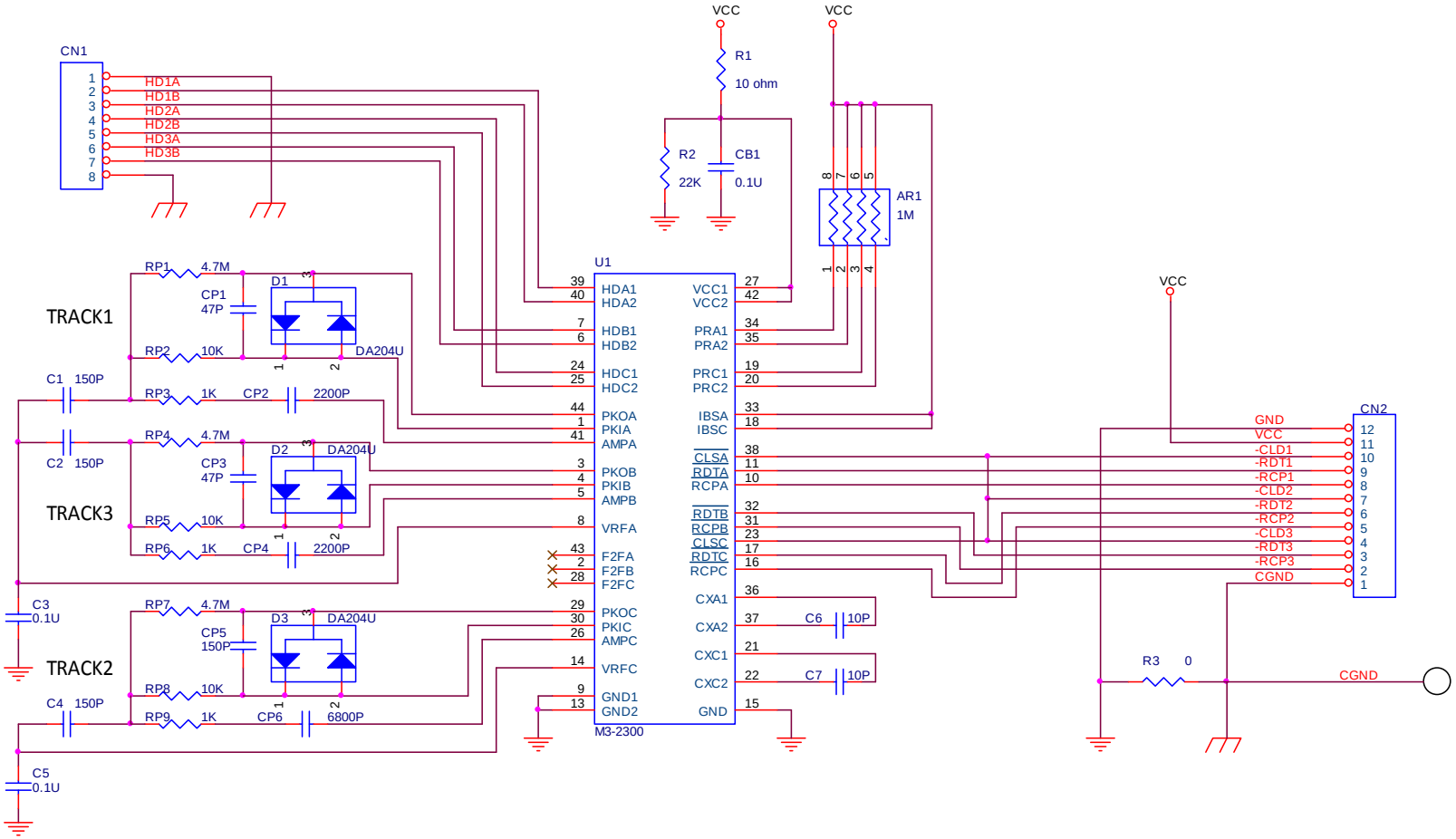
ISO7811 Application Example (VCC = 3.3V DC, tolerance ±5%)



Note1. We recommend that R2 should be 10K~100K to increase circuit reliability and R2 circuit line should be short.
Note2. D1, D2 and D3 (DA204U diode) should be made by Rohm Co., LTD or the ones with the same quality.
Note3. If your application must read Track2 with both bit density 75 BPI (ISO) and 210 BPI (non-ISO), you can adjust CP5 to 68P and CP6 to 4700P. The reader's performance usually gets worse than the original one for only reading 75 BPI (ISO).

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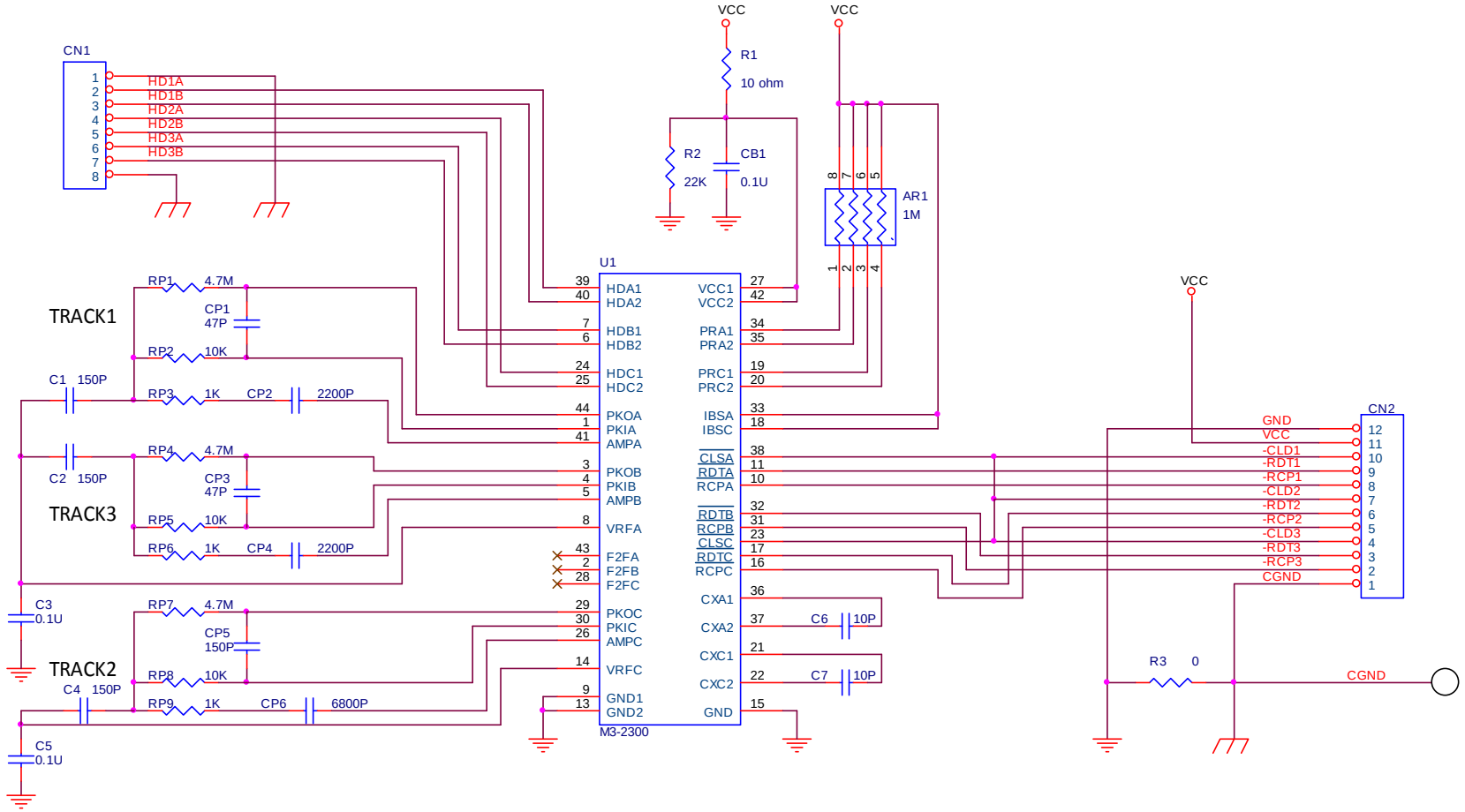
ISO7811 Application Example (VCC = 5.0V DC, tolerance ±5%)



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