F81485

5V Low Power RS-485 Interface Transceiver

Release Date: Jan, 2012
Version: V0.11P

F81485 Datasheet Revision History

Version	Date	Page	Revision History
V0.10P	2011/12	-	Preliminary
V0.12P	2012/01	-	Made Clarification and Correction Update Top Marking Specification Update Differential Input Threshold Spec.

Table of Content

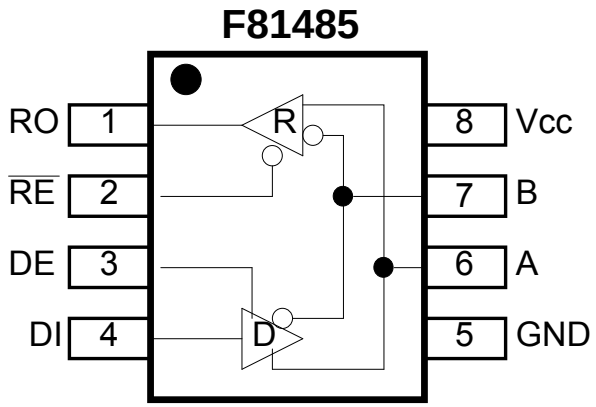
1 General Description

The F81485 is a CMOS design, features with single 5 V power supply, and low power differential bus/line transceiver suitable for the multipoint data transmission EIA standard RS485 and RS422 applications. The extended common-mode range is −7 V to +12 V. Both the driver and the receiver can be enabled independently. The driver and receiver feature three-state outputs, with the driver outputs maintaining high impedance over the entire common-mode range. Excessive power dissipation caused by the bus contention or faults is prevented by a thermal shutdown circuit which forces the driver outputs into a high impedance state. The receiver contains a fail-safe feature that results in a logic high output state if the inputs are unconnected (floating). Up to 32 transceivers can be connected simultaneously on a bus, but only one driver should be enabled at any time. The F81485 features extremely fast switching speeds. Minimal driver propagation delays permit transmission at data rates up to 5 Mbps while low skew minimizes EMI interference. All inputs and outputs contain protection against ESD; all driver outputs feature high source and sink current capability. An epitaxial layer is used to guard against latch-up.

2 Feature List

- Single 5V Supply
- Meets EIA RS-485 standard
- High speed, low power BiCMOS
- -7V to 12V Bus Common-Mode Range Permits
- ±7V Ground Difference Between Devices on the Bus
- ESD ±8KV Contact
- Thermal Shutdown Protection
- Driver Maintains High Impedance in Three-State or with the Power Off
- 70mV Typical Input Hysteresis
- Driver propagation delay: 10 ns typical
- Receiver propagation delay: 15 ns typical
- High-Z outputs with power off
- Pin Compatible with the ADM485, SP485
- 8 Pin SOP Packaging

3 Pin Configuration



4 Pin Description

IN_t	- TTL level input pin.
O_4	- Output pin with 4mA driver.
P	- Power.

4.1. Power Pin

Pin	Pin Name	Type	Description
5	GND	P	GND.
8	VCC	P	4.75V< VCC < 5.25V power supply voltage input.

4.2. Transceiver

Pin	Pin Name	Type	Description
1	RO	O_4	Receiver Output. When enabled (RE# is low), then if A > B by 200 mV, RO is high. A < B by 200 mV, RO is low.
2	RE#	IN_t	Active Low Receiver Output Enable pin. A low level enables the receiver output, RO. A high level places it in a high impedance state.
3	DE	IN_t	Active High Driver Output Enable. A high level enables the driver differential outputs, A and B. The chip will function as a line driver. A low level places it in a high impedance state. The chip will function as a line receiver.

4	DI	IN_t	Driver Input. When the driver is enabled (DE is high), a logic low on DI forces A low and B high, while a logic high on DI forces A high and B low.
6	A	I/O	Non-inverting Receiver Input A/Driver Output A.
7	B	I/O	Inverting Receiver Input B/Driver Output B.

Transmitting

Inputs			Line Condition	Outputs	
RE#	DE	DI		B	A
X	1	1	No Fault	0	1
X	1	0	No Fault	1	0
X	0	X	X	Z	Z
X	1	X	Fault	Z	Z

Receiving

Inputs			Ouptuts
RE#	DE	A-B	R
0	0	≥0.2V	1
0	0	≤0.2V	0
0	0	Inputs Open	1
1	0	X	Z

5 Electrical Characteristics Request

5.1 Absolute Maximum Ratings

PARAMETER		RATING	UNIT
Vcc		±12	V
Input Voltage	Logic	-0.3 to Vcc +0.5	V
	Drivers	-0.3 to Vcc +0.5	V
	Receivers	±15	
Output Voltage	Logic	-0.3 to Vcc +0.5	V
	Drivers	±15	V
	Receivers	-0.3 to Vcc +0.5	
Storage Tempreature		-65 to +150	°C
Lead Temperature (soldering, 10s)		+300	°C
Power Disspation		500	mW

Note: Exposure to conditions beyond those listed under Absolute Maximum Ratings may adversely affect the life and reliability of the device

Test condition: VCC = 5V

PARAMETER	SYMBOL	MIN.	TYP.	MAX	UNIT	CONDITIONS
Supply Voltage		4.75		5.25	V	
Supply Current			900		μA	No Load
Operating Temperature		0		70	◦ C	

5.2 Driver Section

Test condition: VCC = 5V

PARAMETER	SYMBOL	MIN.	TYP.	MAX	UNIT	CONDITIONS
DC Characteristics						
Differential Output Voltage		GND		Vcc	V	Unloaded, R= ∞
		2		Vcc	V	With load, R = 50Ω (RS422)
		1.5		Vcc	V	With load, R = 27Ω (RS485)
Differential Output Voltage for Complimentary States				0.2	V	R = 27Ω or R = 50Ω
Output Voltage				3	V	R = 27Ω or R = 50Ω
Input High Voltage		2.0			V	Applies to DE, DI, RE#
Input Low Voltage				0.8	V	Applies to DE, DI, RE#
Input Current				±10	μA	Applies to DE, DI, RE#
Driver Short Current		35		250	mA	VOUT = High, -7V ≤ Vo ≤ +12V
		35		250	mA	VOUT = Low, -7V ≤ Vo ≤ +12V

PARAMETER	SYMBOL	MIN.	TYP.	MAX	UNIT	CONDITIONS
AC Characteristics						
Maximum Data Rate		5			Mbps	RE# = 5V, DE = 5V
Driver Input to Output		20	30	60	ns	t_{PLH}; R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF
		20	30	60	ns	t_{PHL}; R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF
Driver Skew			5	10	ns	t_{SKEW} = | t_{DPLH} - t_{DPHL} |
Driver Rise or Fall Time		3	15	40	ns	10% to 90%, R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF
Driver Enable to Output High			40	70	ns	C_{L1} = 100pF
Driver Enable to Output Low			40	70	ns	C_{L1} = 100pF
Driver Disable Time from Low			40	70	ns	C_{L1} = 15pF
Driver Disable Time from High			40	70	ns	C_{L1} = 15pF

5.3 Receiver Section

Test condition: VCC = 5V

PARAMETER	SYMBOL	MIN.	TYP.	MAX	UNIT	CONDITIONS
DC Characteristics						
Differential Input Threshold		-300		+0	mV	-7V ≤ V_{CM} ≤ +12V
Input Hysteresis			10		mV	V_{CM} = 0V
Output Voltage High		3.5			V	I_o = -4mA, V_{ID} = +200mV
Output Voltage Low				0.4	V	I_o = +4mA, V_{ID} = -200mV
Output Current				±1	μA	0.4V ≤ Vo ≤ 2.4V, RE# = -5V
Input Resistance		12	15		k	-7V ≤ V_{CM} ≤ +12V
Input Current (A,B), V_{IN} = 12V				+1.0	mA	DE = 0V, V_{cc} = 0V or 5.25V, V_{IN} = 12V
Input Current (A,B), V_{IN} = -7V				-0.8	mA	DE = 0V, V_{cc} = 0V or 5.25V, V_{IN} = -7V
Short Circuit Current		7		95Ω	mA	0V ≤ V_{CM} ≤ V_{cc}

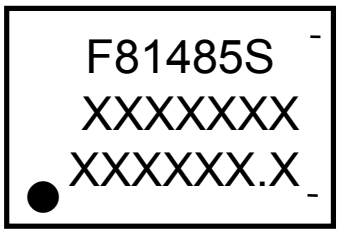
PARAMETER	SYMBOL	MIN.	TYP.	MAX	UNIT	CONDITIONS
AC Characteristics						
Maximum Data Rate		5			Mbps	RE# = 0V, DE = 0V
Receiver Input to Output		60	90	200	ns	t_{PLH}; R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF
		60	90	200	ns	t_{PHL}; R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF
Receiver Skew			13		ns	t_{SKEW} = | t_{DPLH} - t_{DPHL} |
Receiver Enable to Output Low			20	50	ns	C_{RL} = 15pF
Receiver Enable to Output High			20	50	ns	C_{RL} = 15pF
Receiver Disable Time from Low			20	50	ns	C_{RL} = 15pF
Receiver Disable Time from High			20	50	ns	C_{RL} = 15pF

6 Ordering Information

Part Number	Package Type	Production Flow
F81485S	8-SOP Green Package	Commercial, 0°C to +70°C

7 Top Marking Specification

The version identification is shown as the bold red characters. Please refer to below for detail:



1st Line: Fintek Logo

2nd Line: Device Name → **F81485S,** where S means 8-SOP package

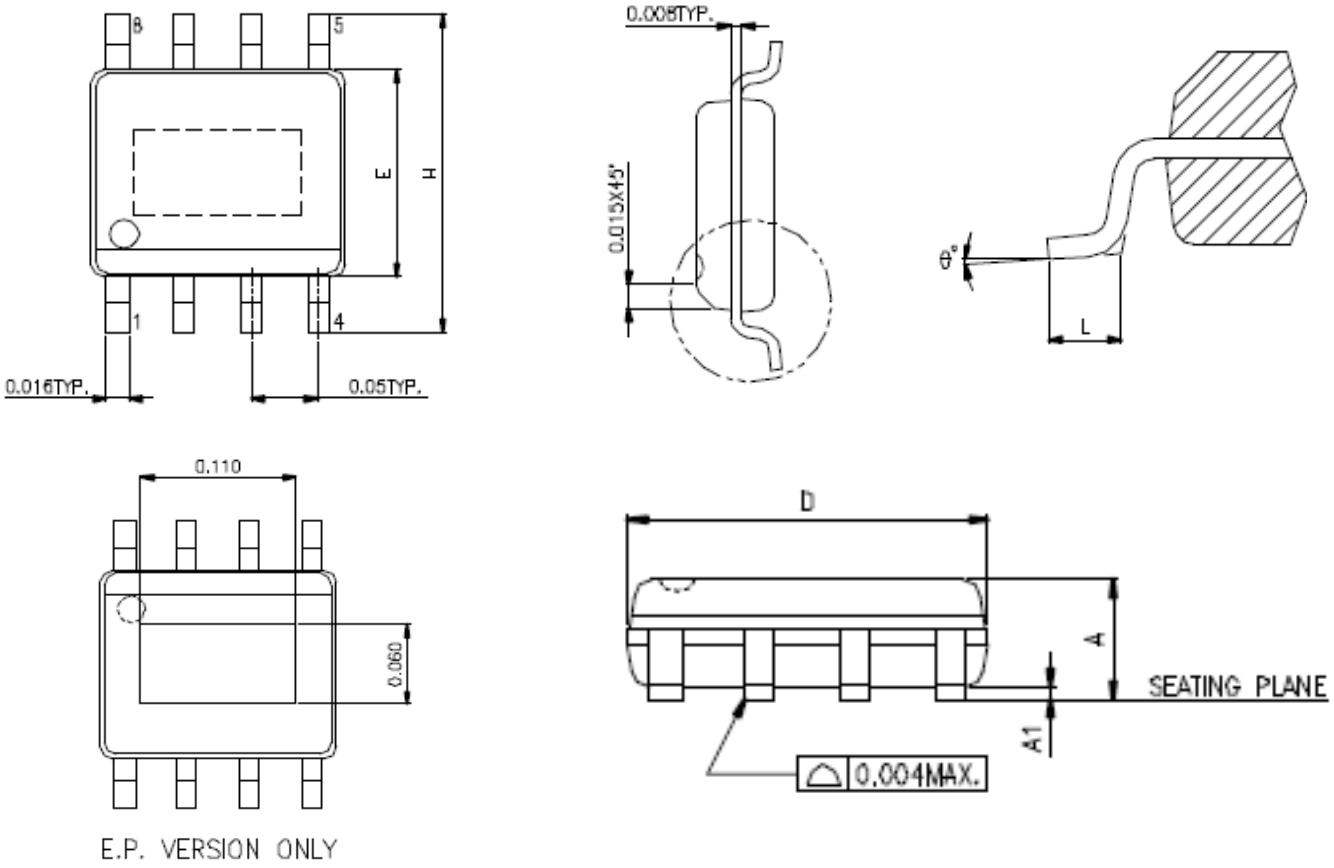
2nd Line: Assembly Plant Code (X) + Assembled Year Code (X) + Week Code (XX) + Fintek Internal Code (XX) + **IC Version (X)** where A means version A, B means version B, …

3rd Line: Wafer Fab Code (XXXX…XX)

● : Pin 1 Identifier

8 Package Spec.

8-SOP Package



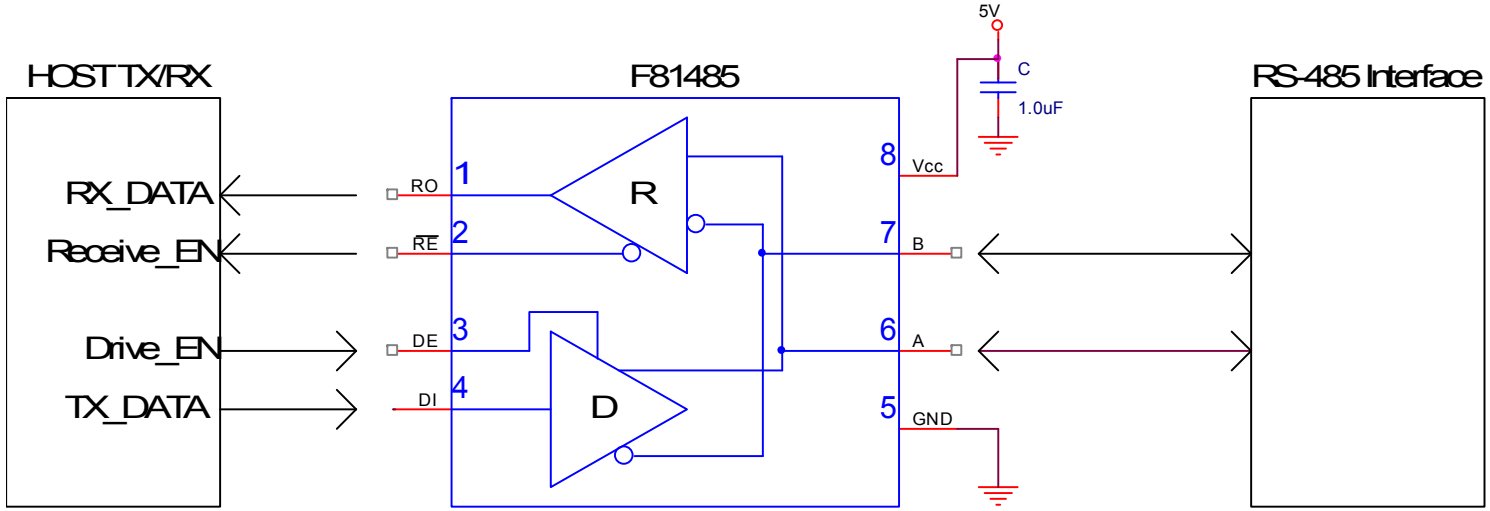
E.P. VERSION ONLY

SYMBOLS	MIN.	MAX.
A	0.053	0.069
A1	0.004	0.010
D	0.189	0.196
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
θ°	0	8

UNIT : INCH

NOTES:
1. JEDEC OUTLINE : MS-012 AA / E.P. VERSION : N/A
2. DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .15mm (.006in) PER SIDE.
3. DIMENSIONS "E" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.010in) PER SIDE.

9 Application Circuit



MODE SELECTION

/RE	DE	MODE
0	0	RS485 Recieve
1	1	RS485 Drive
0	1	RS485 LoopBack
1	0	Dis_RS485

Title			
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