F75198

USB Charger ID

Release Date: Sept, 2013
Version: V0.11P

F75198 Datasheet Revision History

Version	Date	Page	Revision History
0.10P	2013/07		First publish
0.11P	2013/09		Typo correction

Table of Content

1 General Description

The F75198 is an USB Dedicated Charger identification circuit which is so smart to recognized most of mainstream handheld devices. It allows device to draw a current as much as using an original adapter.

The F75198 can support most of the USB Battery Charging Specification worldwide, including BC 1.2, Apple® charging spec (for i-Pad & i-Phones) and specs for Samsung Galaxy Tab.

Apple inc. has upgrade its charger output capacity for tablets to 12W output (maximum 2.4A).

By setting the USB Data pins (D+/D-) to the required voltage levels, then the charging device will recognize the voltage levels, and starts to draw the current to charge. It also equipped with a select pin (SEL) allows users to selection desired charging current for apple devices.

The F75198 is suitable for all charger products with USB interface. It provides enhanced ESD protection up to ±8kV on the DP and DM. With the compact SOT23-5 Package, it require minimum external circuits, which can reduce develop & production cost dramatically.

2 Feature List

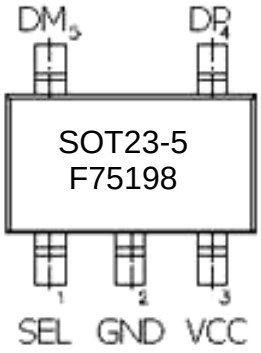
- 4.5V~5.5V Single Supply Operation.
- Automatic USB charger Identification Circuit.
- Support Apple® Devices fast charging. (Selectable auto Apple® 2.4A / 2A / 1A mode)
- Support BC1.2 DCP & YD/T 1591-2009 Charging Spec.
- Support Samsung Galaxy tab Devices Charging.
- ±8kV High ESD Protection On DP/DM.
- Available in SOT23-5 Package.
- Operation Temperatures range from -40℃ to 70℃ ※

3 Application Field

- Computer peripherals.
- In-Car Chargers
- Wall-Adapter / Power Plugs, Outlets
- USB Power Plugs (extensions)
- Mobile Power Supply

※Design Guarantee

4 Pin Configuration



Pin Configuration of F75198

5 Pin Description

IN - input pin with schmitt trigger.
OUT - Open-drain output pin
P -Power.

4.1. Pin Description

F75198	Pin Name	Type	Description
1	SEL	IN	Reference Bias Selection Pin (Internal Pull High) Default / pull-high with 1K : Apple 2A mode Pull-down with 1K: Apple 1A mode Pull-down with 1.5M: Apple 2.4A mode
2	GND	Ground	Ground
3	VCC	P	Power
4	DP	Analog	USB positive data-channel to external USB device
5	DM	Analog	USB negative data-channel to external USB device

6 Function Description

6.1 F75198 General Function Description

6.1.1 Configuration & Description

The F75198 is a special designed USB charger controller can be applied in any dedicated USB charging solution. The F75198 is able to identify the types of USB device (Apple® devices,BC1.2 USB devices or Samsung Tabs) that is attached to the charging port, and change the configuration of D+/D- data line will emulate dedicated wall adapter instantly. It allows the USB charging port to support both Apple, BC1.2 & Samsung Tab compliant devices.

The following Figure explains how the F75198 works:

As shown below, F75198 application structure. The F75198 is attached is only controls the D+ / D- signal of the system. It detects the characteristics of the devices attached. Then automatically changes the configuration of D+ / D- according to the type of device which attached to connector.

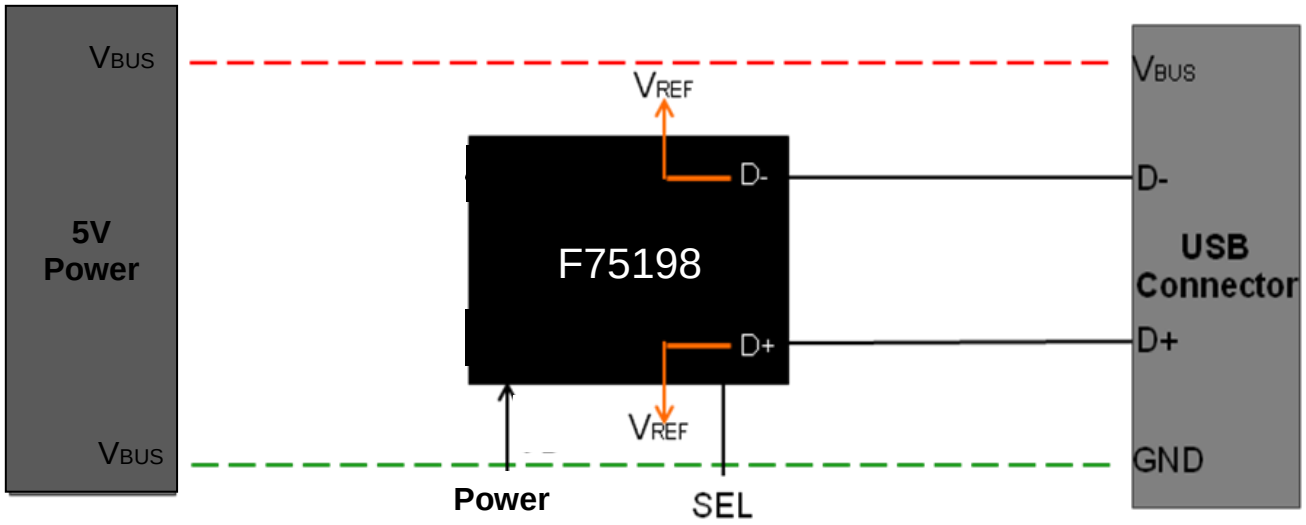


Figure 6.2 Charger Mode (Auto Detect Mode)

※ **IMPORTANT MESSAGES**

Please notice that, the F75198 does not involve any power-related operation, it controls only the behavior of the D+ / D- of USB charger port. All the power management & protection mechanism should be done in the power source block. The F75198 provide only the D+ / D- device recognition.

For the best performance, we recommended that manufactures use the power source that have the capability to provide at least 5.2V / 2.4A DC power for each USB Charging port.

6.1.2 The Selection of Reference Bias Resistor – SEL

The F75198 equipped with 3 sets of reference bias resistors for Apple, one allow for the apple device to draw 2A and 2.4A (max) charging current device (Default) and another allows apple device to draw only 1A current (MAX) only. Users can use a single digital input (SEL) to switch between these two reference bias sets.
By change the pull-up or pull-down resistance of SEL pin can change the maximum charging current of APPLE device that is going to be attached on the charging port and still able to auto detects BC1.2 and Samsung products. The following table shows how F75198 works under different modes:

Table 5.1.2: Truth Table of SEL

SEL	Description	Mode Descriptions				
		Apple 2.4A	**Apple 2.1A**	**Apple 1A**	**BC1.2 DCP**	**Samsung Tab mode**
Pull-high (with 1K resistor)	**Auto Apple 2A mode**	Disable	Auto detect	Auto detect	Auto detect	Auto detect
Pull-down (with 1K resistor)	**Auto Apple 1A mode**	Disable	Disable	Auto detect	Auto detect	Auto detect
Pull-down (with 1.5M resistor)	**Auto Apple 2.4A mode**	Auto detect	Auto detect	Auto detect	Auto detect	Auto detect

Attention: for Apple 2.4A mode, the USB power source must have the capability of 5.2V / 2.5A output to exceed the 12W.

Although the F75198 has a selection pin, which can change the D+ / D- voltage confirmation between Apple® 1A, 2A, 2.4A mode. It's not recommended, however, by use this function as current limit protection, or to restrain the charging current of Apple® devices to 1A or less by using this feature.

7 Electrical Characteristics

Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNIT
Voltages Referenced to GND	VCC, TDP, TDM, CB, DP, DM, CEN	-0.3 to 6.0	V
Continuous Current into Any Terminal		±30	mA
※ Maximum junction temperature (plastic package)	T_j	+150	°C
※ Maximum storage temperature	T_{STO}	-65 ~ +150	°C
※ Maximum lead temperature (soldering 10s)		+260	°C

Note: **If ICs are stressed beyond the limits listed in the "absolute maximum ratings", they may be permanently destroyed. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.**

Package thermal information

PARAMETER	SYMBOL	SOIC	UNIT
Thermal resistance junction-ambient	Rth_ja		°C/W

Recommended Operating Conditions

Supply Voltage, VCC ---------- 2.8V~5.5V
Ambient Temperature Range---------- -40°C to 70°C※
Junction Temperature Range---------- -40°C to 125°C
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DC and AC electrical characteristics (VCC=5V, TA = 25℃)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
POWER SUPPLY						
Operating Power Supply Range	Vcc	$V_{CB} > V_{IH}$	4.5		5.5	V
		V_{CB} = 0V	4.5		5.5	V
Supply Current	I_{CC}	Vcc =4.5V		150	200	uA
		Vcc = 5.5V		200	250	
ANALOG SWITCH						
Analog Signal Range	V_{DP}, V_{DM}		0		Vcc	V

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
On Resistance of DP/DM short	R_{SHORT}	CB=0, DP=1V, DM=20Kohm		50	70	Ω
Dynamic						
Turn On Time	t_{ON}	V_{TDP} or V_{TDM} =1.5V, R_L=300Ω, C_L=35pF, V_{IH}=Vcc, V_{IH}=0V		17	40	us
ESD Protection						
ESD Protection level (DP and DM only)	V_{ESD}	Air gun contact discharge		±8		kV
ESD Protection level all other pins	V_{ESD}	Human Body Model		±2		kV

※ Design Guarantee

8 Ordering Information

Part Number	Package Type	Production Flow
F75198AD	SOT23-5	Commercial, -40°C to +70°C*

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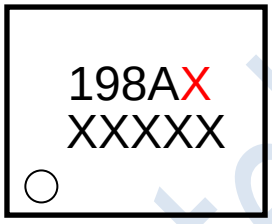
9 Top Marking Specification

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

SOT23-5



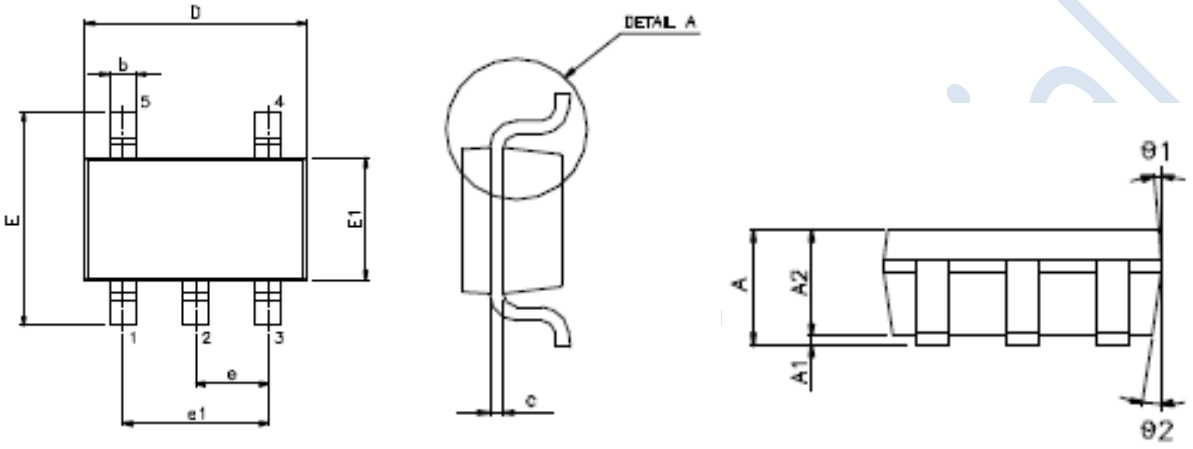
1st Line: Device Name + Package Code (A) + **IC Version (X)**

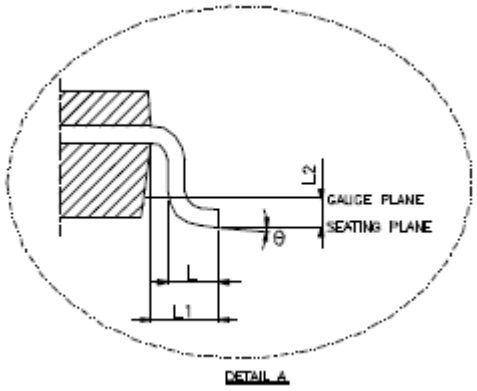
2nd Line: Assembly Code (X)+Internal Code(XXXX)

◯ : Pin 1 Identifier

10 Package Spec.

SOT23-5 Package





VARIATION(ALL DIMENSIONS SHOWN IN MM)

	SYMBOL	MIN.	NOM.	MAX.
	A	1.05	1.20	1.35
	A1	0.05	0.10	0.15
	A2	1.00	1.10	1.20
4	b	0.30	–	0.50
	c	0.08	–	0.20
4	D	2.80	2.90	3.00
	E	2.60	2.80	3.00
	E1	1.50	1.60	1.70
	e		0.95 BSC.	
	e1		1.90 BSC.	
	L	0.30	0.45	0.55
	L1		0.60 REF.	
	L2		0.25 BSC.	
	θ	0°	5°	10°
	θ1	3°	5°	7°
	θ2	6°	8°	10°

NOTE : 1.JEDEC OUTLINE : MO-178 AA

10. Application Circuit