



Genesys Logic, Inc.

GL888F-20
USB Charging Port Controller
Datasheet

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Revision 1.11
Aug. 02, 2013



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Revision History

Revision	Date	Description
1.00	07/05/2013	Formal release
1.10	07/10/2013	Update CH.6 Electrical Characteristics, p.11
1.11	08/02/2013	Update CH.6 Electrical Characteristics, p.11

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CHAPTER 1 GENERAL DESCRIPTION

The GL888F-20 is a USB fast-charging controller which complies with USB Battery Charging Specification (abbrev. as BC). Before the USB BC is released, most handheld devices have different charging mechanisms that are not compliant with each other. Generally speaking, old wall-chargers are useless when you have new handheld devices. Now with a USB enabled wall-charger, it provides unified charging mechanism by traditional USB current supply (0.5A) when charging devices through USB ports. With a USB enabled wall-charger which complies with USB BC, it provides unified charging mechanism by more USB current supply (up to 1.5A) when charging devices through USB ports, so called “fast-charging” mechanism. In another word, GL888F-20 is a high performance solution for “fast-charging” mechanism and it saves at most 66% of charging time.

In addition, the GL888F-20 will automatically detect and charge not only USB BC compliant devices, but also Apple/Samsung/RIM devices. This feature implies wide range of end product applications and provides design flexibility for system manufactures.

CHAPTER 2 FEATURES

- Supports Battery Charging Specification 1.2
- Supports Chinese Communications Industry Standard YD/T 1591-2009
- Auto detect and charge for Apple, Samsung, and BC compliant devices,
- Ultra low power consumption
- Target Application
 - USB universal wall charger
 - Car charger
 - Power bank
 - Wall wart

CHAPTER 3 PIN ASSIGNMENT

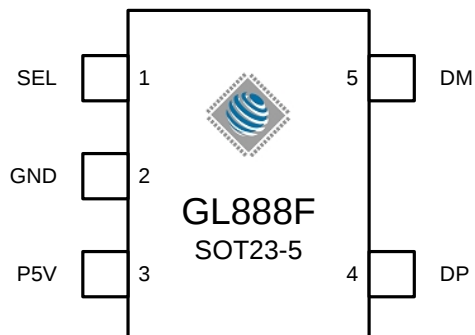


Figure 3.1 – GL888F-20 Pinout

Table 3.1 – GL888F-20 Pin Assignment

NO	GL888F-20	TYPE	DESCRIPTION
1	SEL	I	Charging mode select (internal pull-up) 1: Auto 2.4A mode 0: Auto 1A mode
2	GND	P	Ground
3	P5V	P	5V input
4	DP	I/O	D+ data line to USB connector
5	DM	I/O	D- data line to USB connector

Type Notation (in chip reset status)

I Input mode **P** Power / Ground
O Output mode

CHAPTER 4 ARCHITECTURE

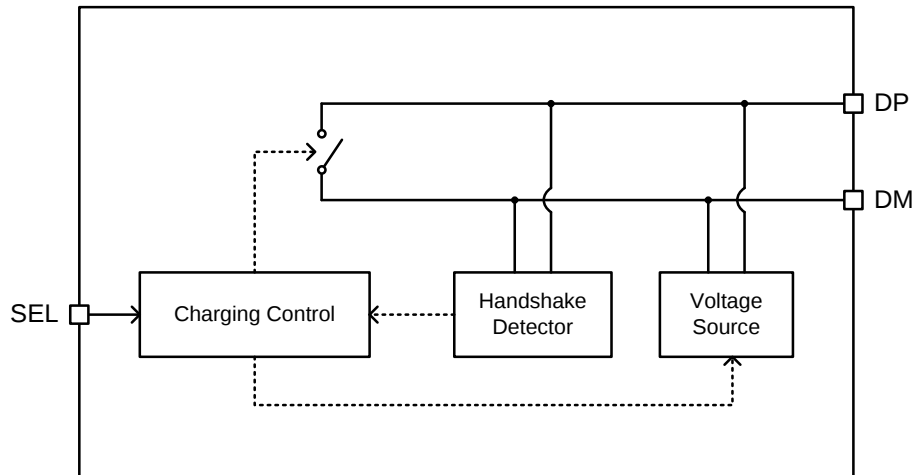


Figure 4.1 – Block Diagram

Figure 4.1 shows the architecture of GL888F-20, which supports different kinds of charger mechanism, including Apple 1A/2.4A wall charger, Samsung Galaxy Tab wall charger, and standard USB charger. In auto mode (refer to Table 5.1), it can automatically detect the type of connected device, and switch to appropriate charging mode.

GL888F-20 is designed for low standby power application. For the system with AC power, the ultra low power consumption of GL888F-20 does not increase the suspend current. And for the system with battery power, GL888F-20 doesn't impact the standby time as well.

CHAPTER 5 CHARGING MODES

GL888F-20 supports several kinds of particular charging modes, described in Table 5.1.

Table 5.1 – Charging Mode Comparison

Charging Mode	Data Transfer	Max Charging Current	Support Device
Apple 1A	X	1A	Apple device ⁽¹⁾
Apple 2.4A	X	2.4A	Apple device ⁽¹⁾
Samsung Tablet ⁽²⁾	X	2A	Samsung Galaxy Tab
Auto 1A	X	2A	Legacy device BC 1.1/1.2 device Apple device (max 1A) Samsung Galaxy Tab
Auto 2.4A	X	2.4A	Legacy device BC 1.1/1.2 device Apple device (max 2.4A) Samsung Galaxy Tab

(1) Refer Apple website for detail support list

(2) Support by GL888F-20 Auto mode

Battery Charging Specification defines three charging ports: SDP, CDP and DCP. The SDP is a standard USB port which can transfer data and provide maximum 500mA (for USB2.0) or 900mA (for USB3.0) current. The purpose of CDP is to replace SDP, so it can charge device with higher current (up to 1.5A) even during USB data transfer. The DCP is only a dedicated charging port which supports high current without data transfer. The BC 1.1/1.2 compliant device is able to be charged whether it connects to CDP or DCP.

Two Apple wall charging modes for Apple devices: “Apple 1A” is for lower battery capacity device, such as iPhone, iPod, and “Apple 2.4A” is for higher battery capacity device, such iPad series. Most up-to-date Apple devices comply with both types of charging modes, so “Apple 2.4A” mode is recommended. Please be noted that the charging current is controlled by device itself, so connecting iPhone to a host under “Apple 2.4A” charging mode may not cause iPhone draw higher charging current than under “Apple 1A” charging mode.

Samsung Galaxy Tab has a dedicated charging behavior, and this is “Samsung Tablet” mode designed for. GL888F-20 can support this under auto mode.

When setting “Auto 1A” mode, GL888F-20 will automatically detect the connected device and switch between DCP, “Apple 1A”, and “Samsung Tablet” mode to charge, whereas “Auto 2.4A” mode will switch between DCP, “Apple 2.4A”, and “Samsung Tablet” mode. To support most up-to-date devices,” Auto 2.4A” mode is strongly recommended.

CHAPTER 6 ELECTRICAL CHARACTERISTICS

Table 6.1 – Temperature Conditions

Parameter	Min	Typ	Max	Unit
Operating temperature	0		70	°C
Storage temperature	-65		150	°C

Test conditions: $V_{P5V}=5V$, $T_A=25^{\circ}C$ (for Table 6.2~6.4)

Table 6.2 – General Characteristics

Parameter	Description	Min	Typ	Max	Unit
V_{P5V}	P5V input voltage	4.5	5	5.5	V
V_{IH}	Input high voltage	4		5.5	V
V_{IL}	Input low voltage	-0.3		1	V
V_{ESD_HBM}	ESD (Human Body Mode)			±7000	V
V_{ESD_MM}	ESD (Machine Mode)			±250	V
Θ_{ja}	Thermal resistance		146.7		°C/W
Θ_{jc}	Thermal resistance		76		°C/W

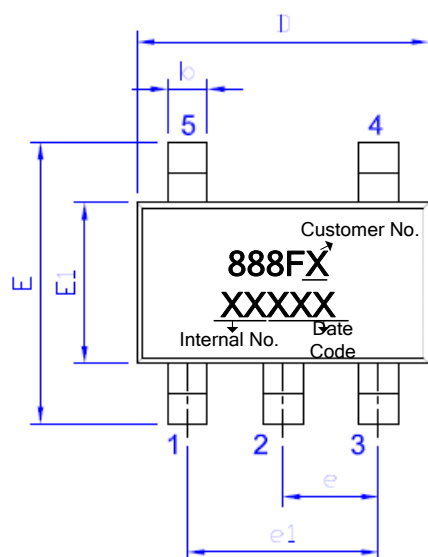
Table 6.3 – Charger Characteristics

Parameter	Description	Min	Typ	Max	Unit
R_{DCP}	DP/DM short resistance in DCP mode		80	200	Ω
V_{DP_APP1A}	DP voltage in Apple 1A mode	1.9	2.0	2.17	V
V_{DM_APP1A}	DM voltage in Apple 1A mode	2.53	2.7	2.9	V
$V_{DP_APP2.4A}$	DP voltage in Apple 2.4A mode	2.53	2.7	2.9	V
$V_{DM_APP2.4A}$	DM voltage in Apple 2.4A mode	1.9	2.7	2.17	V
V_{Galaxy}	DP/DM voltage in Galaxy mode		1.2		V

Table 6.4 – Power Consumption

SEL	Mode	Min	Typ	Max	Unit
0	Auto 1A		150	250	μA
1	Auto 2.4A		150	250	μA

CHAPTER 7 PACKAGE DIMENSION



SYMBOL	DIMENSION MM (MIL)		
	MIN.	NOM.	MAX.
A	---	---	1.45 (57.1)
A1	0.00 (3.9)	---	0.15 (5.9)
A2	0.90 (35.4)	1.15 (45.3)	1.30 (51.2)
b	0.30 (11.8)	---	0.50 (19.7)
c	0.08 (3.1)	---	0.22 (8.7)
D	2.90 (114.2) BSC		
e	0.95 (37.4) BSC		
e1	1.90 (74.8) BSC		
E	2.8 (110.2) BSC		
E1	1.60 (63) BSC		
L	0.30 (11.8)	0.45 (17.7)	0.60 (23.6)
L1	0.60 (23.6) REF		
L2	0.25 (9.8) BSC		
R	0.10 (3.9)	---	---
R1	0.10 (3.9)	---	0.10 (3.9)
y	---	---	0.25 (9.8)
θ	0°	4°	8°
$\theta 1$	5°	10°	15°

NOTE: 1. REFER TO JEDEC MO-178
2. ALL DIMENSIONS IN MILLIMETERS.

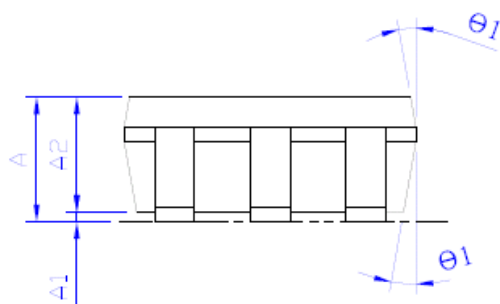
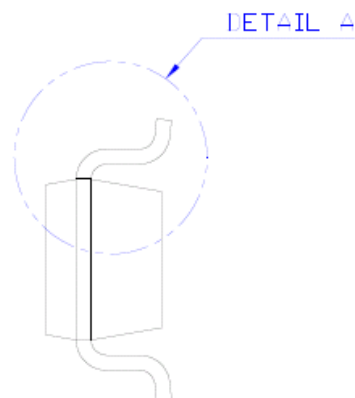
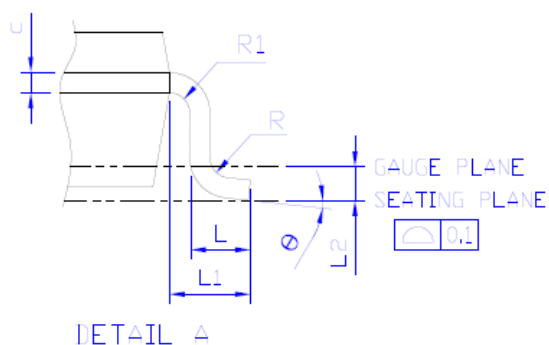


Figure 7.1 – GL888F-20 5 pin SOT23 Package

CHAPTER 8 ORDERING INFORMATION

Table 8.1 – Ordering Information

Part Number	Package	Green/Wire Material	Version	Status
GL888F-20-FIG*X	SOT23-5	Green Package + Au Wire	X	Available

*The marking of "FIG" will not be shown on the IC due to SOT23-5 package size limitation.