USB Dedicated Charging Port Controller

Features

- Supports USB DCP Shorting D+ Line to D– Line per USB Battery Charging Specification,Revision 1.2 (BC1.2)
- Supports Shorted Mode (Shorting D+ Line to D-Line) per Chinese Telecommunication Industry Standard YD/T 1591-2009
- Supports USB DCP Applying 2.7 V on D+ Line and 2 V on D- line (or USB DCP Applying 2 V on D+ Line and 2.7 V on D– Line)
- Supports USB DCP Applying 1.2 V on D+ and D– Lines
- Automatically Switch D+ and D- Lines Connections for an Attached Device
- Dual USB Port Controller
- Operating Range: 4.5 V to 5.5 V
- Available in SOT23-6 Package

Applications

- Vehicle USB Power Chargers
- AC-DC Adapters with USB Ports
- Other USB Chargers

General Description

The TMI9130 devices are USB dedicated charging port (DCP) controllers. An auto-detect feature monitors USB data line voltage, and automatically provides the correct electrical signatures on the data lines to charge compliant devices among the following dedicated charging schemes:

1. Divider 1 DCP, required to apply 2 V and 2.7 V on the D+ and D– Lines respectively
2. Divider 2 DCP, required to apply 2.7 V and 2 V on the D+ and D– Lines respectively(TMI9130,TMI9131)
3. BC1.2 DCP, required to short the D+ Line to the D– Line
4. Chinese Telecom Standard YD/T 1591-2009 Shorted Mode, required to short the D+ Line to the D– Line
5. 1.2 V on both D+ and D– Lines

Typical Application

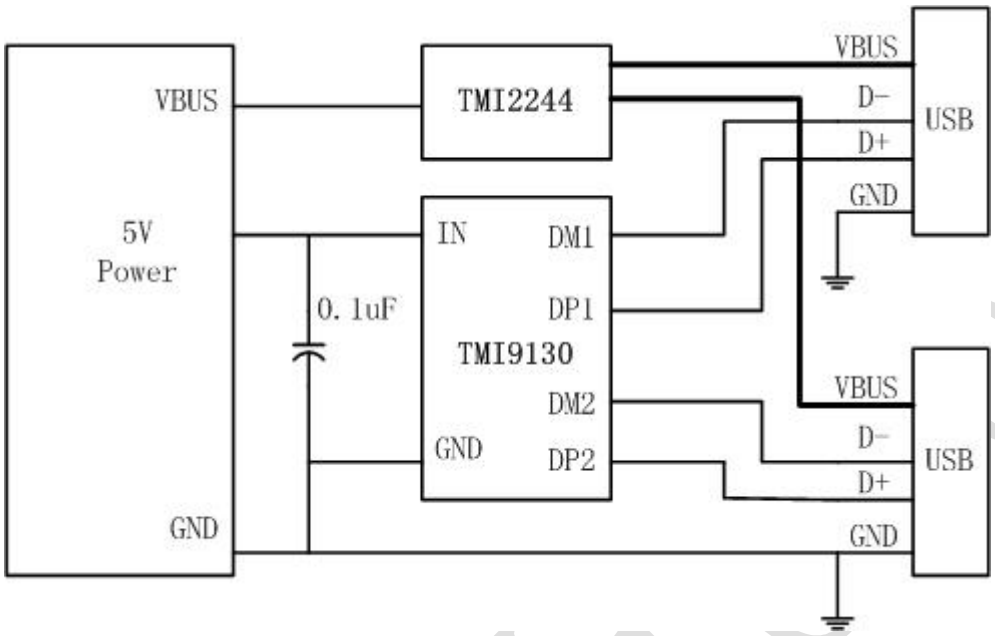
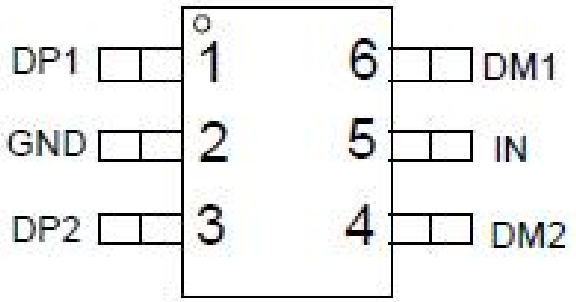


Figure 1. Basic Application Circuit

Pin Configuration



Pin Functions

PIN	NAME	FUNCTION
1	DP1	Connected to the D+ or D– line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.
2	GND	Ground connection
3	DP2	Connected to the D+ or D– line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.
4	DM2	Connected to the D+ or D– line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.
5	IN	Power supply. Connect a ceramic capacitor with a value of 0.1-μF or greater from the IN pin to GND as close to the device as possible.
6	DM1	Connected to the D+ or D–line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.

Device Options

DEVICE	NUMBER OF CONTROLLER	CHARGING SCHEMES (DCP_AUTO)			1.2-V MODE (D+/D– SHORTED AND BIAS TO 1.2 V)	BC1.2 AND YD/T 1591-2009 MODE (D+/D– SHORTED)
		DIVIDER 1 (D+/D– = 2 V/2.7 V)	DIVIDER 2 (D+/D– = 2.7 V/2 V)	DIVIDER 3 (D+/D– = 2.7 V/2.7 V)		
TMI9130	Dual	Yes	Yes	No	Yes	Yes

ESD Ratings

Items	Description	Value	Unit
V_{ESD}	Human Body Model for all pins	±4000	V

JEDEC specification JS-001

Electrical Characteristics

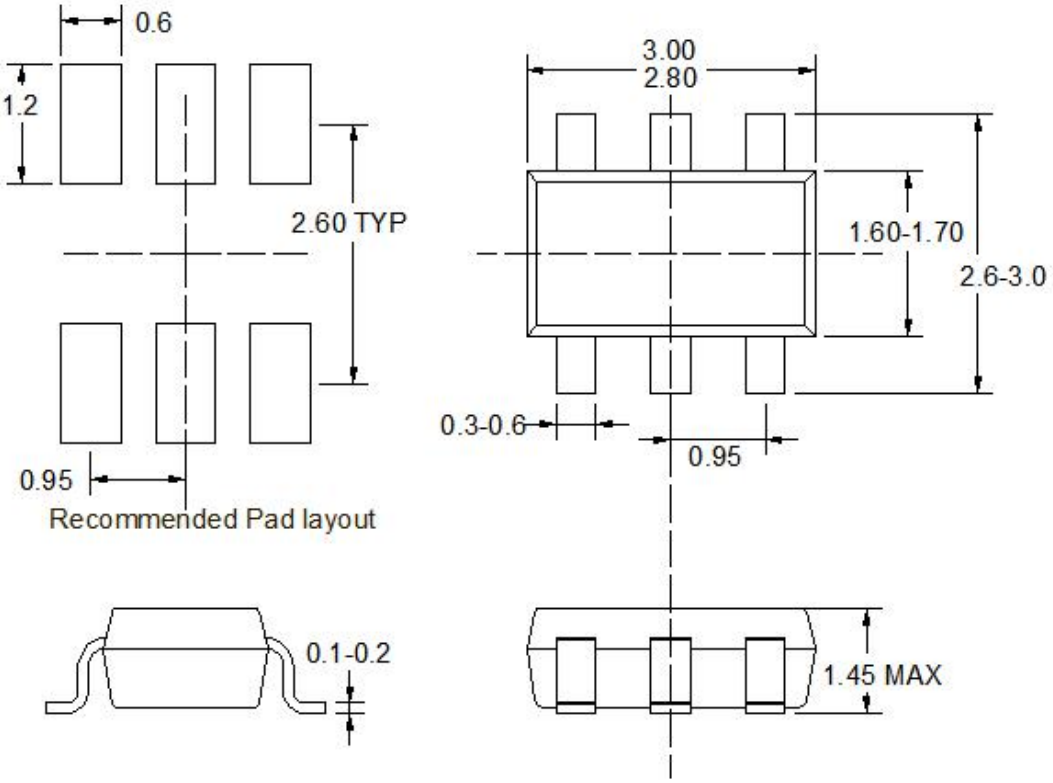
(V_{IN}=5V , T_A = 25°C, unless otherwise noted.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Under Voltage Lockout						
IN rising UVLO threshold voltage	VUVLO		3.9	4.1	4.3	V
UVLO Hysteresis				100		mV
SUPPLY CURRENT						
IN supply current	IIN	4.5 V ≤ V IN ≤ 5.5 V		155	200	uA
BC 1.2 DCP MODE (SHORT MODE)						
DP1 and DM1 shorting resistance	RDPM_SHORT1	VDP1 = 0.8 V, IDM1 = 1 mA		157	200	Ω
Resistance between DP1/DM1 and GND	RDCHG_SHORT1	VDP1 = 0.8 V	350	656	1150	kΩ
Voltage threshold on DP1 (under which the device goes back to divider mode)	VDPL_TH_DETACH1		310	330	350	mV
Hysteresis	VDPL_TH_DETACH_HYS1			50		mV
DP2 and DM2 shorting resistance	RDPM_SHORT2	VDP2 = 0.8V, IDM2 = 1 mA		157	200	Ω
Resistance between DP2/DM2 and GND	RDCHG_SHORT2	VDP2 = 0.8 V	350	656	1150	kΩ
Voltage threshold on DP2 (under which the device goes back to divider mode)	VDPL_TH_DETACH2		310	330	350	mV
Hysteresis	VDPL_TH_DETACH_HYS2			50		mV
DIVIDER MODE						
DP1 output voltage	VDP1_2.7V	VIN = 5 V	2.57	2.7	2.84	V
DM1 output voltage	VDM1_2V	VIN = 5 V	1.9	2	2.1	V
DP1 output impedance	RDP1_PAD1	IDP1 = –5 uA	24	30	36	kΩ
DM1 output impedance	RDM1_PAD1	IDM1 = –5 uA	24	30	36	kΩ

DP2 output voltage	VDP2_2.7V	VIN = 5 V	2.57	2.7	2.84	V
DM2 output voltage	VDM2_2V	VIN = 5 V	1.9	2	2.1	V
DP2 output impedance	RDP2_PAD1	IDP2 = –5 uA	24	30	36	kΩ
DM2 output impedance	RDM2_PAD1	IDM2 = –5 uA	24	30	36	kΩ
1.2 V / 1.2 V MODE						
DP1 output voltage	VDP1_1.2V	VIN = 5 V	1.12	1.2	1.28	V
DM1 output voltage	VDM1_1.2V	VIN = 5 V	1.12	1.2	1.28	V
DP1 output impedance	RDP1_PAD2	IDP1 = –5 uA	80	100	130	kΩ
DM1 output impedance	RDM1_PAD2	IDM1 = –5 uA	80	100	130	kΩ
DP2 output voltage	VDP2_1.2V	VIN = 5 V	1.12	1.2	1.28	V
DM2 output voltage	VDM2_1.2V	VIN = 5 V	1.12	1.2	1.28	V
DP2 output impedance	RDP2_PAD2	IDP2 = –5 uA	80	100	130	kΩ
DM2 output impedance	RDM2_PAD2	IDM2 = –5 uA	80	100	130	kΩ

Package Information

SOT23-6



Notes: All dimensions are in millimeters.

All dimensions don't include mold flash & metal burr.