

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 2.7V 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
- Single USB Port Controller(TMI9130D)
- Dual USB Port Controller(TMI9130C)
- Operating Range: 4.5 V to 5.5 V
- Available in SOT23-6 Package

GENERAL DESCRIPTION

The TMI9130C/D 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 2.7 V and 2.7 V on the D+ and D- Lines respectively (TMI9130C,TMI9130D)
2. BC1.2 DCP, required to short the D+ Line to the D- Line
3. Chinese Telecom Standard YD/T 1591-2009 Shorted Mode, required to short the D+ Line to the D- Line
4. 1.2 V on both D+ and D- Lines

APPLICATIONS

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

TYPICAL APPLICATION

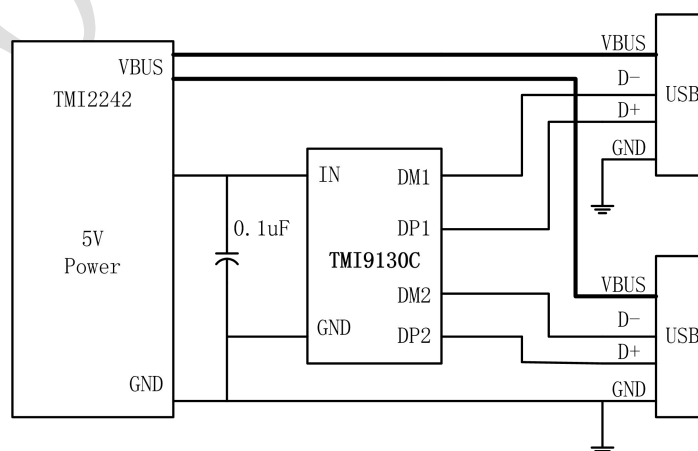
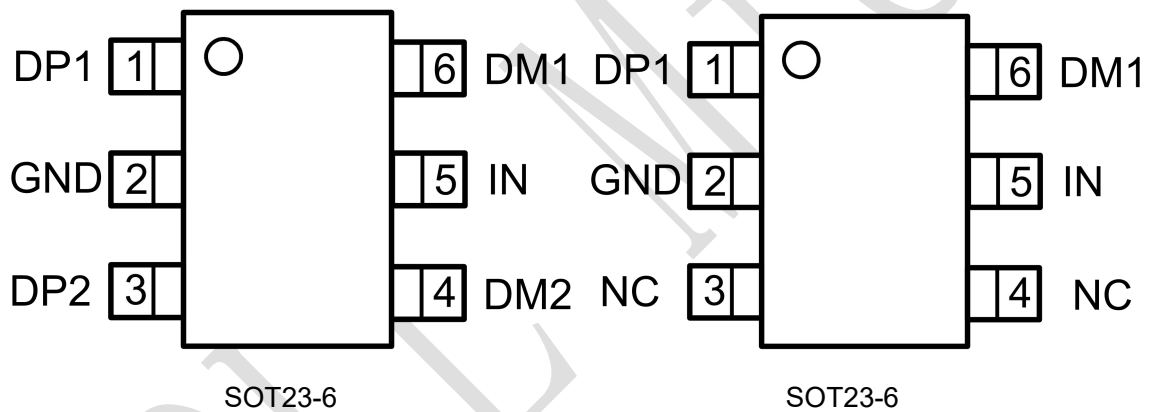


Figure 1. Basic Application Circuit

ABSOLUTE MAXIMUM RATINGS

Parameter	Value	Unit
Input Supply Voltage	-0.3~7	V
DP1, DP2 output voltage, DM1, DM2 output voltage	-0.3~5.8	V
DP1, DP2 input voltage, DM1, DM2 input voltage	-0.3~5.8	V
Junction Temperature	150	°C
Storage Temperature Range	-65~150	°C
Lead Temperature	260	°C

PIN CONFIGURATION



Top Mark: TMI9130C:T24CXX (T24C: Device Code, XX: Inside Code)
TMI9130D:T24DXX (T24D: Device Code, XX: Inside Code)

Part Number	Package	Top mark	Quantity/ Reel
TMI9130C/D	SOT23-6	T24C/DXX	3000

PIN FUNCTIONS

Pin	Name		Function
	TMI9130C	TMI9130D	
1	DP1	DP1	Connected to the D+ line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.
2	GND	GND	Ground connection
3	DP2	NC	Connected to the D+ line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.
4	DM2	NC	Connected to the D- line of USB connector, provide the correct voltage with attached portable equipment for DCP detection.
5	IN	IN	Power supply. Connect a ceramic capacitor with a value of 0.1- μ F or greater from the IN pin to GND as close to the device as possible.
6	DM1	DM1	Connected to the 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- Shorter)
		Divide1 (D+/D- = 2 V/2.7 V)	Divide2 (D+/D- = 2.7 V/2 V)	Divide3 (D+/D- = 2.7 V/2.7 V)		
TMI9130C	Dual	No	No	Yes	Yes	Yes
TMI9130D	Single	No	No	Yes	Yes	Yes

ESD RATINGS

Items	Description	Value	Unit
V _{ESD}	Human Body Model for all pins	\pm 6000	V

JEDEC specification JS-001

RECOMMENDED OPERATING CONDITIONS

Items	Description	Min	Max	Unit
Voltage Range	IN	4.5	5.5	V
TA	Operating Temperature Range	-40	85	°C

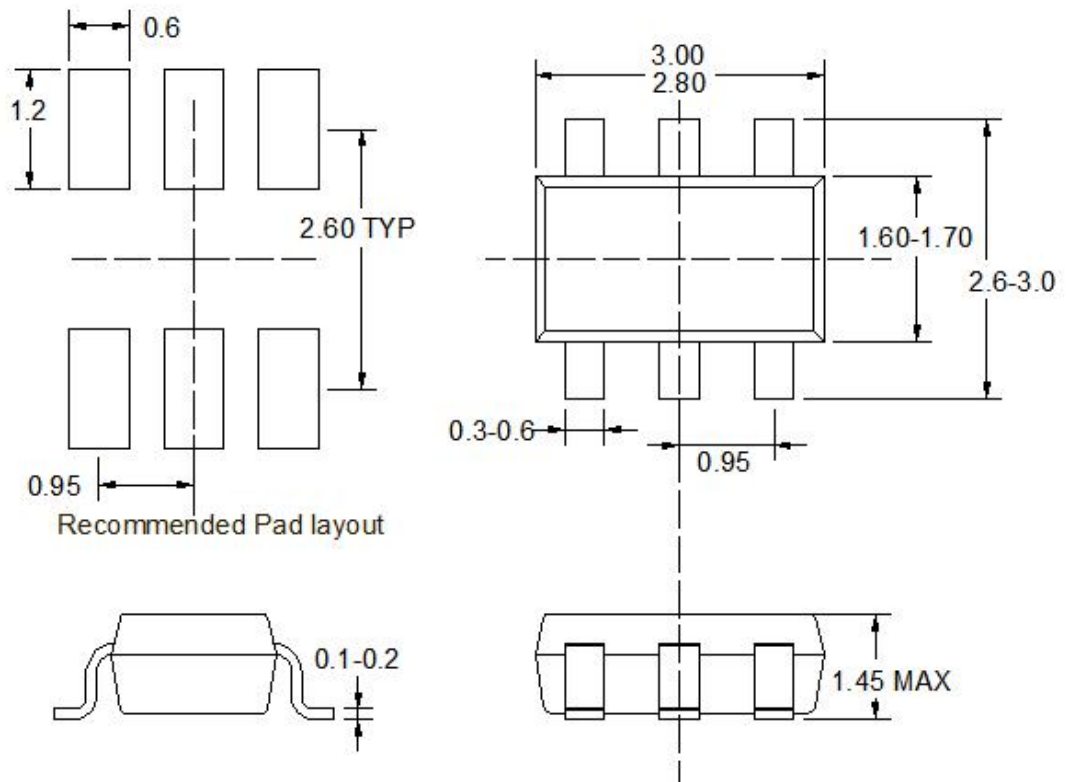
ELECTRICAL CHARACTERISTICS

($V_{IN}=5V$, $T_A = 25^\circ C$, unless otherwise noted.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Under Voltage Lockout						
IN rising UVLO threshold voltage	V_{UVLO}		3.9	4.1	4.3	V
UVLO Hysteresis				100		mV
Supply Current						
IN supply current	I_{IN}	$4.5 V \leq V_{IN} \leq 5.5 V$		155	200	uA
BC 1.2 DCP Mode (Short Mode)						
DP1 and DM1 shorting resistance	R_{DPM_SHORT1}	$V_{DP1} = 0.8 V, I_{DM1} = 1 mA$		157	200	Ω
Resistance between DP1/DM1 and GND	R_{DCHG_SHORT1}	$V_{DP1} = 0.8 V$	350	656	1150	k Ω
Voltage threshold on DP1 (under which the device goes back to divider mode)	$V_{DPL_TH_DETACH1}$		310	330	350	mV
DP1 Hysteresis	$V_{DPL_TH_DETACH_HYS1}$			50		mV
DP2 and DM2 shorting resistance	R_{DPM_SHORT2}	$V_{DP2} = 0.8V, I_{DM2} = 1 mA$		157	200	Ω
Resistance between DP2/DM2 and GND	R_{DCHG_SHORT2}	$V_{DP2} = 0.8 V$	350	656	1150	k Ω
Voltage threshold on DP2 (under which the device goes back to divider mode)	$V_{DPL_TH_DETACH2}$		310	330	350	mV
DP2 Hysteresis	$V_{DPL_TH_DETACH_HYS2}$			50		mV
Divider Mode						

DP1 output voltage	$V_{DP1_2.7V}$	$V_{IN} = 5\text{ V}$	2.57	2.7	2.84	V
DM1 output voltage	V_{DM1_2V}	$V_{IN} = 5\text{ V}$	2.57	2.7	2.84	V
DP1 output impedance	R_{DP1_PAD1}	$I_{DP1} = -5\text{ }\mu\text{A}$	24	30	36	k Ω
DM1 output impedance	R_{DM1_PAD1}	$I_{DM1} = -5\text{ }\mu\text{A}$	24	30	36	k Ω
DP2 output voltage	$V_{DP2_2.7V}$	$V_{IN} = 5\text{ V}$	2.57	2.7	2.84	V
DM2 output voltage	V_{DM2_2V}	$V_{IN} = 5\text{ V}$	2.57	2.7	2.84	V
DP2 output impedance	R_{DP2_PAD1}	$I_{DP2} = -5\text{ }\mu\text{A}$	24	30	36	k Ω
DM2 output impedance	R_{DM2_PAD1}	$I_{DM2} = -5\text{ }\mu\text{A}$	24	30	36	k Ω
1.2 V / 1.2 V Mode						
DP1 output voltage	$V_{DP1_1.2V}$	$V_{IN} = 5\text{ V}$	1.12	1.2	1.28	V
DM1 output voltage	$V_{DM1_1.2V}$	$V_{IN} = 5\text{ V}$	1.12	1.2	1.28	V
DP1 output impedance	R_{DP1_PAD2}	$I_{DP1} = -5\text{ }\mu\text{A}$	80	100	130	k Ω
DM1 output impedance	R_{DM1_PAD2}	$I_{DM1} = -5\text{ }\mu\text{A}$	80	100	130	k Ω
DP2 output voltage	$V_{DP2_1.2V}$	$V_{IN} = 5\text{ V}$	1.12	1.2	1.28	V
DM2 output voltage	$V_{DM2_1.2V}$	$V_{IN} = 5\text{ V}$	1.12	1.2	1.28	V
DP2 output impedance	R_{DP2_PAD2}	$I_{DP2} = -5\text{ }\mu\text{A}$	80	100	130	k Ω
DM2 output impedance	R_{DM2_PAD2}	$I_{DM2} = -5\text{ }\mu\text{A}$	80	100	130	k Ω

PACKAGE INFORMATION



SOT23-6