

# 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 2.7V on D+ Line and 2.7V on D- line
- Supports USB DCP Applying 1.2V on D+ and D- Lines
- Automatically Switch D+ and D- Lines Connections for an Attached Device
- Single USB Port Controller (HM2624D)
- Dual USB Port Controller (HM2624C)
- Operating Range: 4.5V to 5.5V
- Available in SOT23-6 Package

## GENERAL DESCRIPTION

The HM2624C and HM2624D 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 3 DCP, required to apply 2.7V and 2.7V on the D+ and D- Lines respectively (HM2624C, HM2624D)
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. 1.2V on both D+ and D- Lines

## APPLICATIONS

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

## TYPICAL APPILICATION

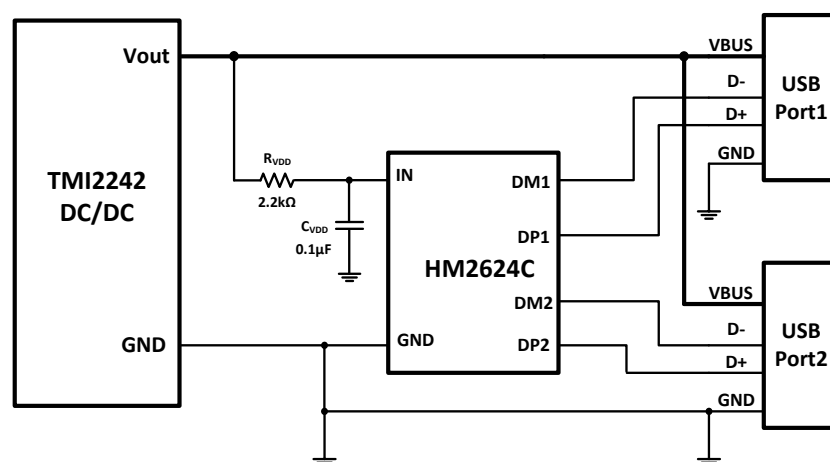
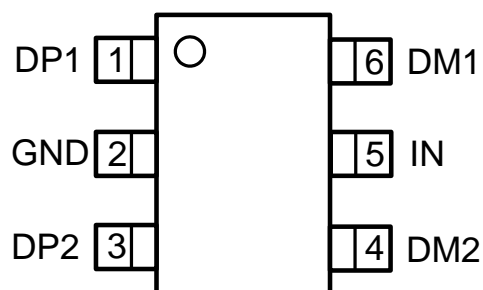


Figure 1. Basic Application Circuit (HM2624C)

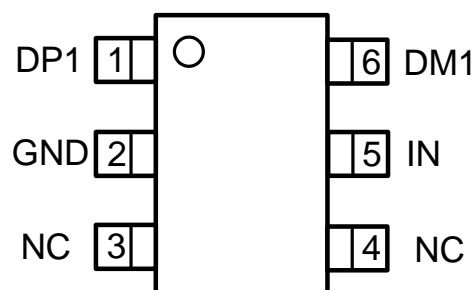
## ABSOLUTE MAXIMUM RATINGS

Parameter	Min	Max	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



**HM2624C**  
**SOT23-6**



**HM2624D**  
**SOT23-6**

**Top Mark: HM2624C: T24CXXX (T24C: Device Code, XXX: Inside Code)**  
**HM2624D: T24DXXX (T24D: Device Code, XXX: Inside Code)**

Part Number	Package	Top Mark	Quantity/ Reel
HM2624C	SOT23-6	T24CXXX	3000
HM2624D	SOT23-6	T24DXXX	3000

HM2624C and HM2624D are Pb-free and RoHS compliant.

## PIN FUNCTIONS

Pin	Name		Function
	HM2624C	HM2624D	
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 0.1μF or larger value from the IN pin to GND or a RC filter from input power supply to IN pin to help filter input surge voltage during power on condition.
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) Divider 3 (D+ = 2.7V / D- = 2.7V)	1.2-V Mode (D+/D- Shorted and Bias to 1.2V)	BC1.2 And YD/T 1591-2009 Mode (D+/D- Shorted)
HM2624C	Dual	Yes	Yes	Yes
HM2624D	Single	Yes	Yes	Yes

## ESD RATINGS

Items	Description	Value	Unit
V <sub>ESD</sub>	Human Body Model for all pins	±6000	V

JEDEC specification JS-001

## RECOMMENDED OPERATING CONDITIONS

Items	Description	Min	Max	Unit
Voltage Range	IN	4.5	5.5	V
T <sub>J</sub>	Operating Junction Temperature Range	-40	125	°C

## ELECTRICAL CHARACTERISTICS

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

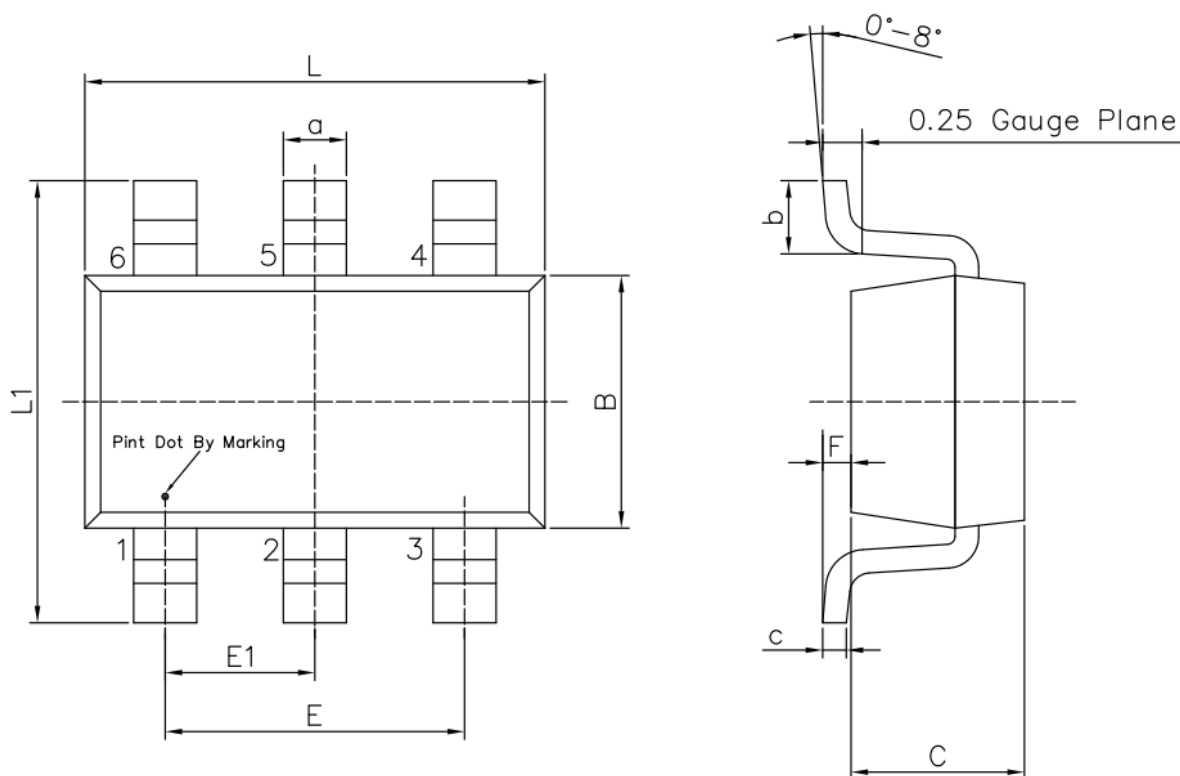
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Under Voltage Lockout</b>						
IN rising UVLO threshold voltage	$V_{UVLO}$		3.9	4.1	4.3	V
UVLO Hysteresis				100		mV
<b>Supply Current</b>						
IN supply current	$I_{IN}$	$4.5V \leq V_{IN} \leq 5.5V$		155	200	$\mu A$
<b>BC 1.2 DCP Mode (Short Mode)</b>						
DP1 and DM1 shorting resistance	$R_{DPM\_SHORT1}$	$V_{DP1}=0.8V$ , $I_{DM1}=1mA$		157	200	$\Omega$
Resistance between DP1/DM1 and GND	$R_{DCHG\_SHORT1}$	$V_{DP1}=0.8V$	350	656	1150	k $\Omega$
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	$R_{DPM\_SHORT2}$	$V_{DP2}=0.8V$ , $I_{DM2}=1mA$		157	200	$\Omega$
Resistance between DP2/DM2 and GND	$R_{DCHG\_SHORT2}$	$V_{DP2}=0.8V$	350	656	1150	k $\Omega$
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
<b>Divider Mode</b>						
DP1 output voltage	$V_{DP1\_2.7V}$	$V_{IN} = 5V$	2.57	2.7	2.84	V
DM1 output voltage	$V_{DM1\_2V}$	$V_{IN} = 5V$	2.57	2.7	2.84	V
DP1 output impedance	$R_{DP1\_PAD1}$	$I_{DP1} = -5\mu A$	24	30	36	k $\Omega$
DM1 output impedance	$R_{DM1\_PAD1}$	$I_{DM1} = -5\mu A$	24	30	36	k $\Omega$
DP2 output voltage	$V_{DP2\_2.7V}$	$V_{IN} = 5V$	2.57	2.7	2.84	V
DM2 output voltage	$V_{DM2\_2V}$	$V_{IN} = 5V$	2.57	2.7	2.84	V
DP2 output impedance	$R_{DP2\_PAD1}$	$I_{DP2} = -5\mu A$	24	30	36	k $\Omega$
DM2 output impedance	$R_{DM2\_PAD1}$	$I_{DM2} = -5\mu A$	24	30	36	k $\Omega$
<b>1.2 V / 1.2 V Mode</b>						
DP1 output voltage	$V_{DP1\_1.2V}$	$V_{IN} = 5V$	1.12	1.2	1.28	V
DM1 output voltage	$V_{DM1\_1.2V}$	$V_{IN} = 5V$	1.12	1.2	1.28	V
DP1 output impedance	$R_{DP1\_PAD2}$	$I_{DP1} = -5\mu A$	80	100	130	k $\Omega$
DM1 output impedance	$R_{DM1\_PAD2}$	$I_{DM1} = -5\mu A$	80	100	130	k $\Omega$

## ELECTRICAL CHARACTERISTICS<sub>(Continued)</sub>

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
DP2 output voltage	$V_{DP2\_1.2V}$	$V_{IN} = 5V$	1.12	1.2	1.28	V
DM2 output voltage	$V_{DM2\_1.2V}$	$V_{IN} = 5V$	1.12	1.2	1.28	V
DP2 output impedance	$R_{DP2\_PAD2}$	$I_{DP2} = -5\mu A$	80	100	130	k $\Omega$
DM2 output impedance	$R_{DM2\_PAD2}$	$I_{DM2} = -5\mu A$	80	100	130	k $\Omega$

## PACKAGE INFORMATION

### SOT23-6



Unit: mm

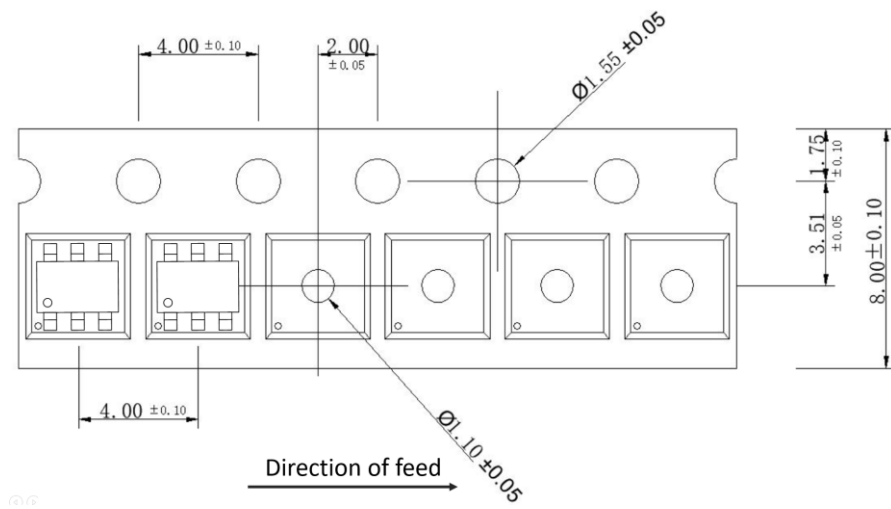
Symbol	Dimensions In Millimeters			Symbol	Dimensions In Millimeters		
	Min	Typ	Max		Min	Typ	Max
L	2.82	2.92	3.02	E1	0.85	0.95	1.05
B	1.50	1.60	1.70	a	0.35	0.425	0.50
C	0.90	1.10	1.30	c	0.10	0.15	0.20
L1	2.60	2.80	3.00	b	0.35	0.45	0.55
E	1.80	1.90	2.00	F	0	0.075	0.15

#### Note:

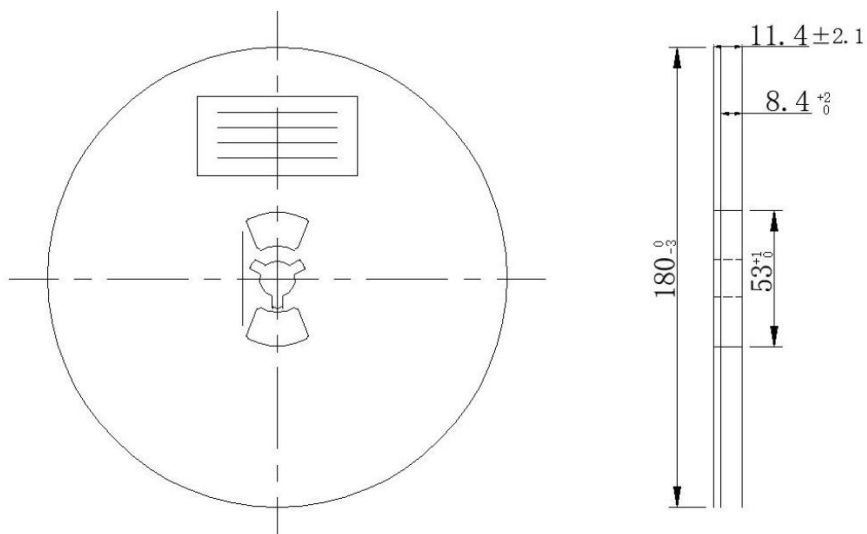
- 1) All dimensions are in millimeters.
- 2) Package length does not include mold flash, protrusion or gate burr.
- 3) Package width does not include inter lead flash or protrusion.
- 4) Lead popularity (bottom of leads after forming) shall be 0.10 millimeters max.
- 5) Pin 1 is lower left pin when reading top mark from left to right.

## TAPE AND REEL INFORMATION

### TAPE DIMENSIONS: SOT23-6



### REEL DIMENSIONS: SOT23-6



#### Note:

- 1) All Dimensions are in Millimeter
- 2) Quantity of Units per Reel is 3000
- 3) MSL level is level 3.