USB Dedicated Charging Port Controller

Single Channel: IP2111,IP2111A,IP2110 / Dual Channel: IP2112,IP2112A

1. Features

- IP2112, IP2112A support dual channel USB ports charging control
- IP2111, IP2111A, IP2110 support single channel USB port charging control
- IP2112/IP2111:
  - ✧ Support Apple 2.1A: DP = 2.7V, DM = 2.0V (Reverse DP, DM for Apple 1.0A Mode)
- IP2112A/IP2111A:
  - ✧ Support Apple 2.4A: DP = 2.7V, DM = 2.7V
- IP2110:
  - ✧ Apple 2.4A: DP = 2.7V, DM = 2.7V
  - ✧ Apple 1.0A: DP = 2.0V, DM = 2.7V (Reverse DP, DM for Apple 1.0A Mode)
  - ✧ SEL pin configure maximum current allotment
- Support Samsung 2.0A: DP = 1.2V, DM =1.2V
- Support BC1.2: DP short to DM automatically
- Support auto-detect and auto-switching charging standards
- Very low power consumption I_Q = 66uA(Typ.)
- Working voltage: 3V~5.5V
- Package:
  - ✧ IP2112/IP2112A/IP2111/IP2111A:SOT23-6
  - ✧ IP2110：SOT23-5

2. Description

IP2111,IP2111A,IP2112,IP2112A,IP2110 is a low-cost dedicated charging Physical Layer IC dedicated for USB ports, which supports Apple 2.4A/2.1A/1.0A, Samsung 2.0A and BC1.2. IP2112, IP2112A support dual channel USB port charging control and IP2111, P2111A , IP2110support single channel. IP2110 support SEL pin to configure the maximum allotment current. An auto-detect feature monitors USB data line voltage, and automatically provides the correct electrical signatures on the data lines to charge compliant devices.

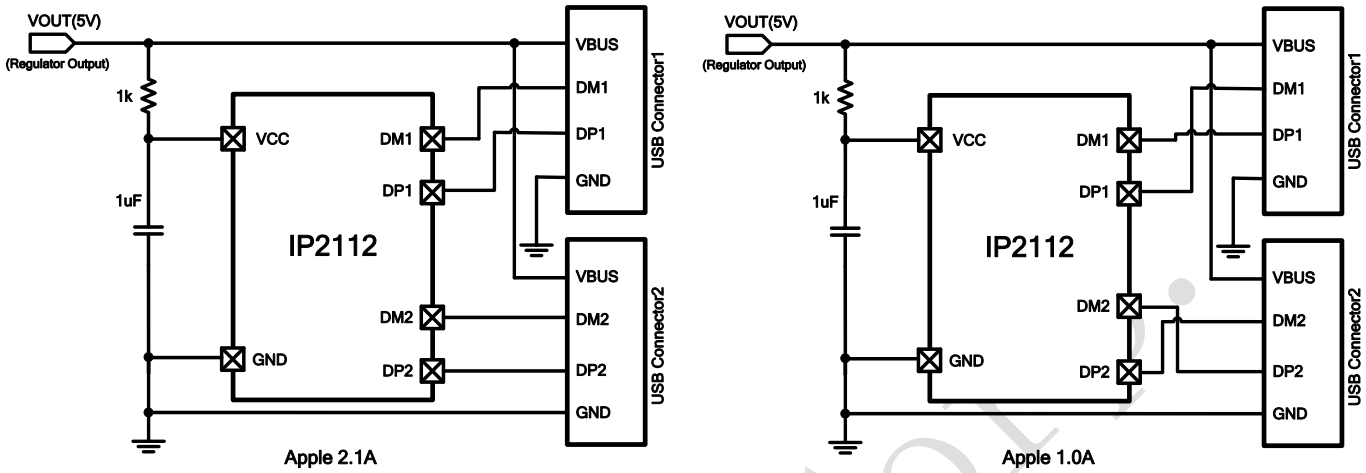
3. Application

- USB power output ports for AC adapters, Power Banka, Car chargers
- Battery chargers for smart phones, tablets, netbooks, digital cameras, and Bluetooth accessories

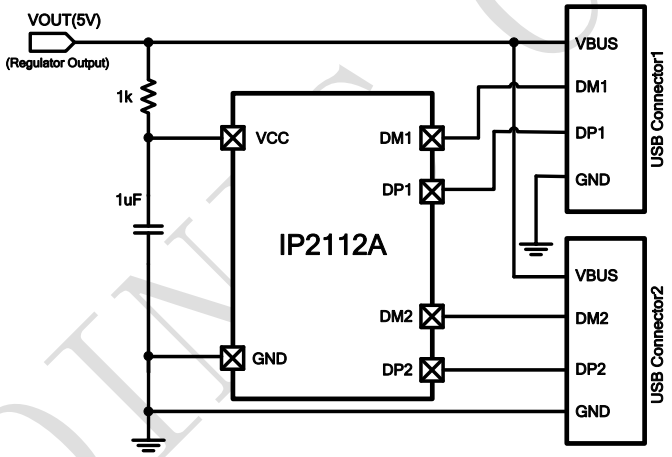
4. Product Package Introduction

No.	Product	Package	Channel	Maximum Allotment Current for Apple Device
1	IP2112	SOT23-6	2	2.1A
2	IP2112A	SOT23-6	2	2.4A
3	IP2111	SOT23-6	1	2.1A
4	IP2111A	SOT23-6	1	2.4A
5	IP2110	SOT23-5	1	2.4A, SEL configurable

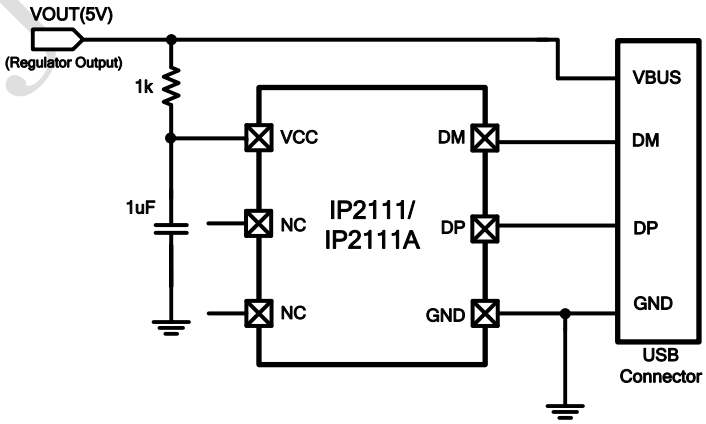
5. Typical Application Schematic



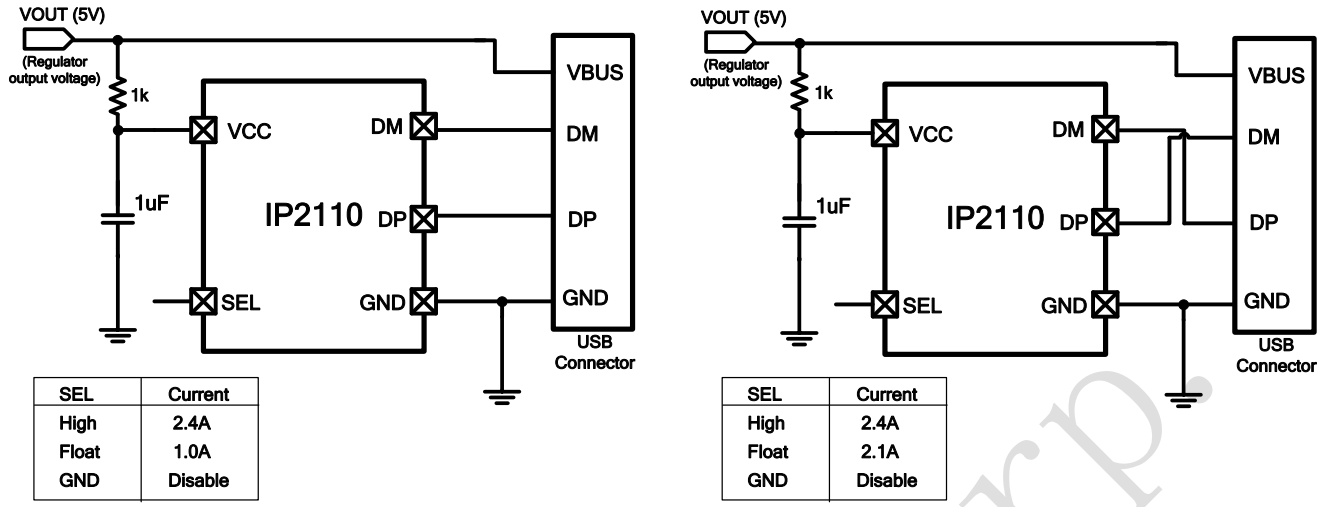
IP2112 Typical Application Circuit



IP2112A Typical Application Circuit

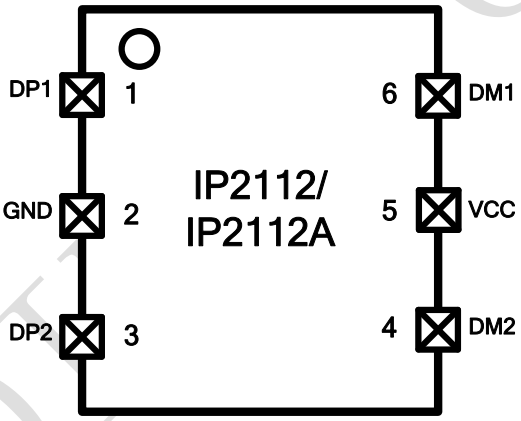


IP2111,IP2111A Typical Application Circuit

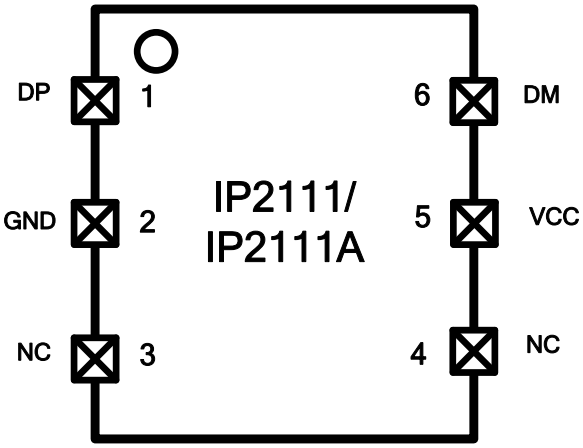


IP2110 Typical Application Circuit

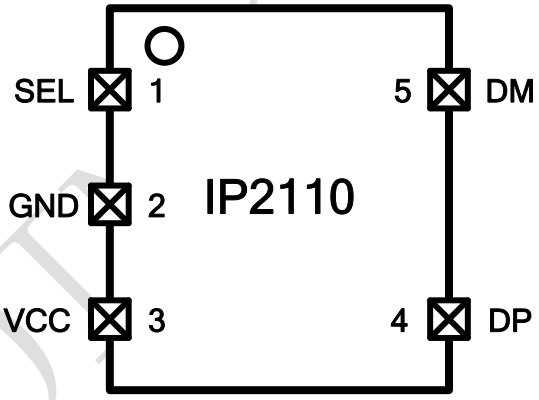
6. PIN Description



引脚名	引脚编号	引脚描述
DP1	1	Connect to USB1 DP data line
GND	2	Ground
DP2	3	Connect to USB2 DP data line
DM2	4	Connect to USB2 DM data line
VCC	5	Power supply input, connect with 1uF capacitor to GND
DM1	6	Connect to USB1 DM data line



引脚名	引脚编号	引脚描述
DP	1	Connect to USB DP data line
GND	2	Ground
NC	3	NC pin, floating
NC	4	NC pin, floating
VCC	5	Power supply input, connect with 1uF capacitor to GND
DM	6	Connect to USB DM data line



Pin Name	**Pin No.**	**Pin Description**
SEL	1	Configure the maximum Current allowed to apply for: • High: Apple 2.4A • Float: Apple 1.0A • GND: Disable (DP, DM do not work, in high-z state)
GND	2	Ground
VCC	3	Power supply input, connect with 1uF capacitor to GND
DP	4	Connect to USB DP data line
DM	5	Connect to USB DM data line

7. IP Series Products List

Power Bank IC

IC Part No.	Charge /Discharge		Features							Package	
	Charge	Dis-charge	LED Num	Lighting	Keys	I2C	DCP	Type-C	QC Certificate	Package	Compatibility
IP5303	1.0A	1.2A	1,2	√	√	-	-	-	-	eSOP8	PIN2PIN
IP5305	1.0A	1.2A	1,2,3,4	√	√	-	-	-	-	eSOP8	
IP5306	2.4A	2.1A	1,2,3,4	√	√	-	-	-	-	eSOP8	
IP5206	2A (Max)	1.5A	3,4,5	√	√	-	-	-	-	eSOP16	PIN2PIN
IP5108E	2.0A	1.0A	3,4,5	√	√	-	-	-	-	eSOP16	
IP5108	2.0A	2.0A	3,4,5	√	√	√	-	-	-	eSOP16	
IP5207	1.2A	1.2A	3,4,5	√	√	-	-	-	-	QFN24	PIN2PIN
IP5207T	1.2A	1.2A	1,2,3,4	√	√	√	√	-	-	QFN24	
IP5109	2.1A	2.1A	3,4,5	√	√	√	-	-	-	QFN24	
IP5209	2.4A	2.1A	3,4,5	√	√	√	√	-	-	QFN24	
IP5219	2.4A	2.1A	1,2,3,4	√	√	√	√	√	-	QFN24	
IP5310	3.1A	3.0A	1,2,3,4	√	√	√	√	√	-	QFN32	
IP5312	15W	3.6A	2,3,4,5	√	√	√	√	-	-	QFN32	
IP5318Q	18W	4.0A	2,3,4,5	√	√	√	√	-	√	QFN40	PIN2 PIN
IP5318	18W	4.0A	2,3,4,5	√	√	√	√	√	√	QFN40	
IP5322	18W	4.0A	1,2,3,4	√	√	√	√	-	√	QFN32	
IP5328	18W	4.0A	1,2,3,4	√	√	√	√	√	√	QFN40	

USB Charging Port Control IC

IC Part No.	Channel Num	Standards Supported											Package
		BC1.2 & APPLE	QC3.0 & QC2.0	FCP	SCP	AFC	SFCP	MTK PE+ 2.0&1.1	Type-C	NTC	QC Certi-ficate	PD3.0	
IP2110	1	√	-	-	-	-	-	-	-	-	-	-	SOT23-5
IP2111, IP2111A	1	√	-	-	-	-	-	-	-	-	-	-	SOT23-6
IP2112, IP2112A	2	√	-	-	-	-	-	-	-	-	-	-	SOT23-6
IP2161	1	√	√	√	-	√	√	-	-	-	√	-	SOT23-6
IP2163	1	√	√	√	-	√	√	√	-	√	√	-	SOP8

IP2701	**1**	**√**	**√**	**√**	**-**	**√**	**√**	**-**	**√**	**-**	**-**	**-**	SOP8
IP2703	**1**	**√**	**√**	**√**	**-**	**√**	**√**	**√**	**√**	**√**	**-**	**-**	DFN10
IP2705	**1**	**√**	**√**	**√**	**-**	**√**	**√**	**√**	**√**	**√**	**-**	**-**	DFN12
IP2707	**2**	**√**	**√**	**√**	**-**	**√**	**√**	**√**	**√**	**√**	**-**	**-**	QFN16
IP2716	**1**	**√**	**√**	**√**	**√**	**√**	**-**	**1.1**	**√**	**-**	**√**	**√**	QFN32

8. Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
VCC Input Voltage Range	VCC	-0.3 ~ 7	**V**
DP, DM Input Voltage Range	V_{DP1}, V_{DM1} ,V_{DP2}, V_{DM2}	-0.3 ~ 10	**V**
Other pins Voltage		-0.3~6.5	**V**
Junction Temperature Range	T_J	-40 ~ 150	℃
Storage Temperature Range	Tstg	-60 ~ 150	℃
Lead Temperature (Soldering, 10sec.)	Ts	260	℃
Ambient Temperature Range	T_A	-40 ~ 150	℃
Package Thermal Resistance	θ_{JA}	250	**℃/W**
Package Thermal Resistance	θ_{JC}	110	**℃/W**
Human Body Model (HBM)	ESD	4	**KV**

*Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to Absolute Maximum Rated conditions for extended periods may affect device reliability.

*Voltages are referenced to GND unless otherwise noted.

9. Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Voltage	VCC	3		5.5	V
Ambient Temperature	T_A	-40		85	℃

*Devices' performance cannot be guaranteed when working beyond those Recommended Operating Conditions.

10. Electrical Characteristics

Unless otherwise specified, T_A=25℃, 4.5V ≤ VCC ≤ 5.5V

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage	VCC		3		5.5	V
Input UVLO Threshold	UVLO	VCC Falling	2.5		2.9	V
Quiescent Current	I_Q	No load, VCC=5V	50	66	100	uA
Startup Time	Ts		8	10	12	ms

DP, DM		SEL=GND		High-z		
Apple Mode						
DP1/DP2 Voltage	V_{DP1}/V_{DP2}	IP2112, IP2112A, IP2111, IP2111A	2.64	2.7	2.76	V
DP Voltage	V_{DP}	IP2110, SEL=V_{SELH}	2.64	2.7	2.76	V
		IP2110, SEL=Float	1.95	2.0	2.05	V
DM1/DM2 Voltage	V_{DM1}/V_{DM2}	IP2112, IP2111	1.95	2.0	2.05	V
		IP2112A, IP2111A	2.64	2.7	2.76	V
DM Voltage	V_{DM}	IP2110 , SEL=V_{SELH}	2.64	2.7	2.76	V
		IP2110 , SEL=Float	2.64	2.7	2.76	V
DP1/DM1/DP2/DM2/DP/DM Output Impedance	$R_{DP1}/R_{DM1}/R_{DP2}/R_{DM2}/R_{DP}/R_{DM}$	IP2112, IP2112A, IP2111, IP2111A, IP2110		30		kOhm
Samsung Mode						
DP1/DM1/DP2/DM2/DP/DM Voltage	$V_{DP1}/V_{DP2}/V_{DM1}/V_{DM2}/V_{DP}/V_{DM}$	IP2112, IP2112A, IP2111, IP2111A, IP2110	1.08	1.2	1.32	V
DP1/DM1/DP2/DM2/DP/DM Output Impedance	$R_{DP1}/R_{DM1}/R_{DP2}/R_{DM2}/R_{DP}/R_{DM}$	IP2112, IP2112A, IP2111, IP2111A, IP2110		100		kOhm

11. Function Description

Charging Standards

IP2112, IP2112A, IP2111, IP2111A, IP2110 is a low-cost dedicated charging Physical Layer IC dedicated for charging applications where charging standards required to be negotiated between USB ports. IP2112, IP2112A, IP2111, IP2111A, IP2110 is needed at the host-side, when the attached portable client-side devices negotiate the power allotment from the power source host-side.

IP2112, IP2112A support dual channel USB port charging control, in control of two independent USB port. IP2111, IP2111A, IP2110 support single USB port charging control.

IP2112, IP2112A, IP2111, IP2111A, IP2110 auto-detect feature monitors USB data line voltage, and automatically provides the correct electrical signatures on the data lines to charge compliant devices. IP2112, IP2112A, IP2111, IP2111A, IP2110 supports Apple 2.4A/2.1A/1.0A, Samsung 2.0A and BC1.2. IP2112, IP2112A, IP2111, IP2111A, IP2110 is not in control of the charging power loop, the actual charging loop and charging current is determined by the host-side power source and the client-side USB port device.

For Apple Devices, the maximum current allotment of IP2111, IP2112 is 2.1A, IP2111, IP2112 support reverse

connect DP, DM pin on PCB board to realize the maximum current allotment of 1.0A. The maximum current allotment of IP2111A, IP2112A, IP2110 is 2.4A.

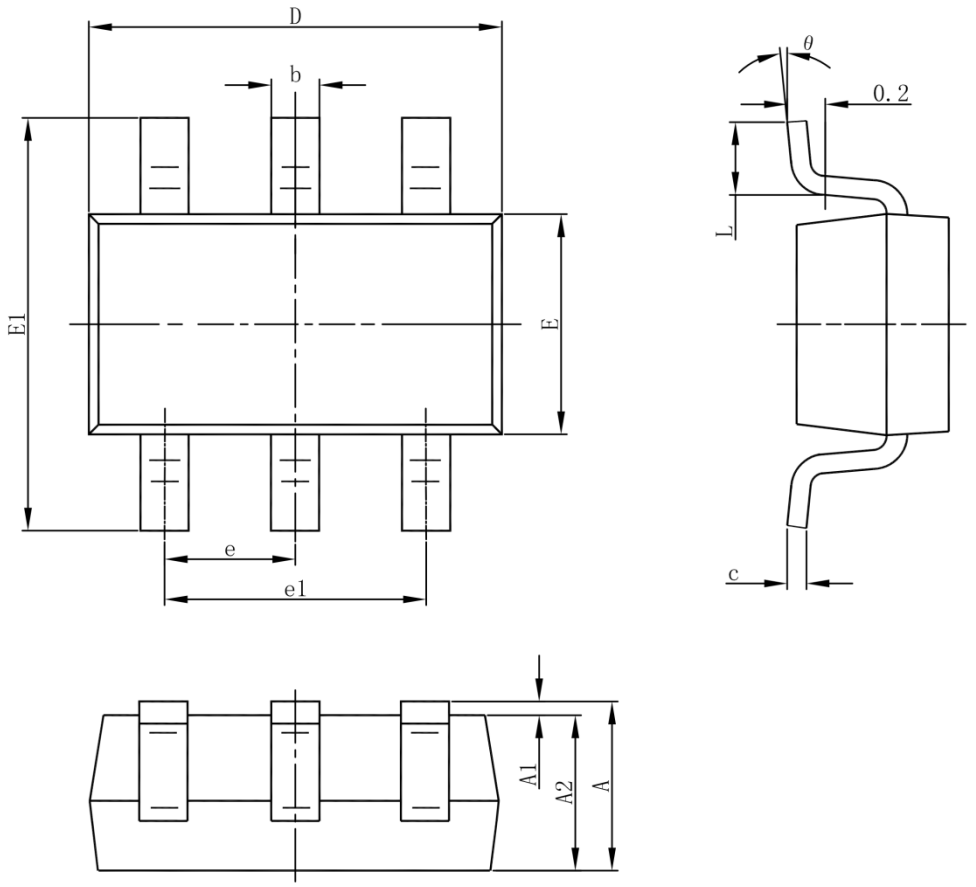
SEL

IP2110's SEL line is used to configure the maximum current allotment for Apple, when SEL line is pull up to high-voltage of V_{SELH}, the maximum current allotment of IP2110 is 2.4A; when SEL line is floating, the maximum current allotment is 1.0A. Reverse the DP, DM on PCB board, the maximum current allotment is 2.1A. when the SEL line is pull down to GND, IP2110 will not respond to any charging requirements, DP, DM are in high-z state.

SEL1	**Current**
High (V_{SELH})	2.4A
Float	1.0A
GND	Disable

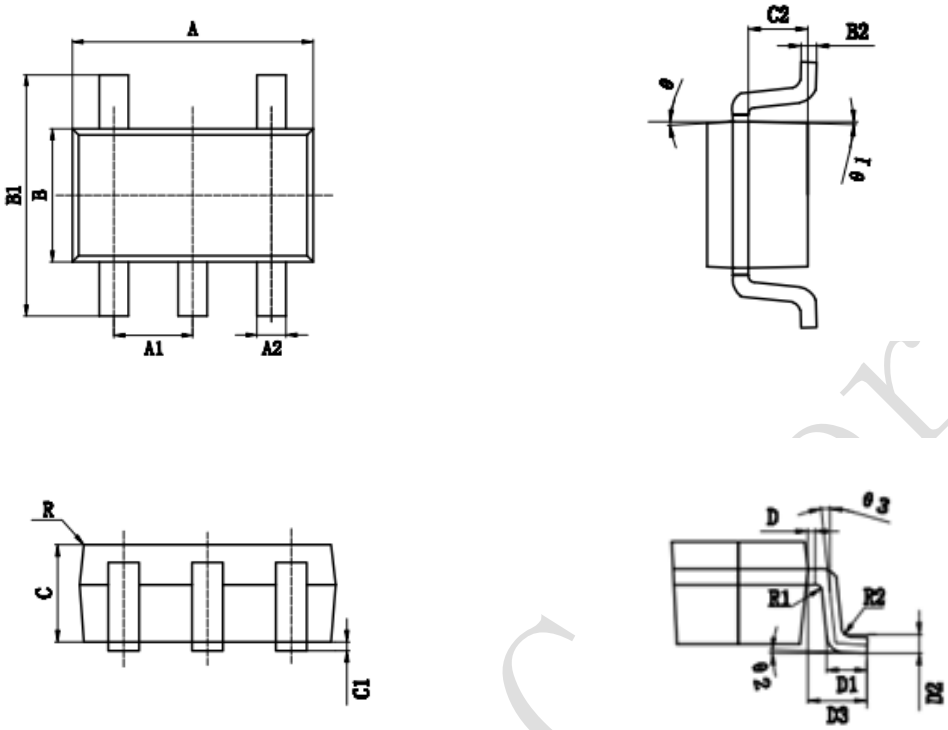
12. Package

SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

SOT23-5



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.82		3.02
A1	0.90		1.00
A2	0.35		0.45
B	1.52		1.72
B1	2.80		3.00
B2	0.119		0.135
C	1.05		1.15
C1	0.03		0.13.
C2	0.60		0.70
D	0.03		0.13
D1	0.40		0.50
D2	0.254TYP		
D3	0.60		0.70
θ		9 °TYP4	
θ1		10 °TYP4	
θ2	0 °		8 °
θ3		6 °TYP	
R			0.2TYP
R1		0.08 TYP	
R2		0.08TYP	

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