

USB Charger Emulator with Adjustable Power Switch

FEATURES

- 45 mΩ High-Side MOSFET
- 0.5~4.0 A (typ.) Adjustable Current Limit
- 6.0mA Average Current in OUT shorted GND
- Support Apple® Devices fast charging (Apple® 2.1A / 2.4A mode)
- Support Samsung Galaxy Tab Devices fast Charging
- Support BC1.2 & YD/T 1591-2009 Charging Spec
- Linear Current sense of Output Current.
- Built-in Soft-Start
- Support single layer PCB layout.
- 4.5 ~ 6.5V Single Supply Operation.
- Available EMSOP8, ESOP8 package.

APPLICATIONS

- USB Charger
- USB Wall Adapter
- Car Charger

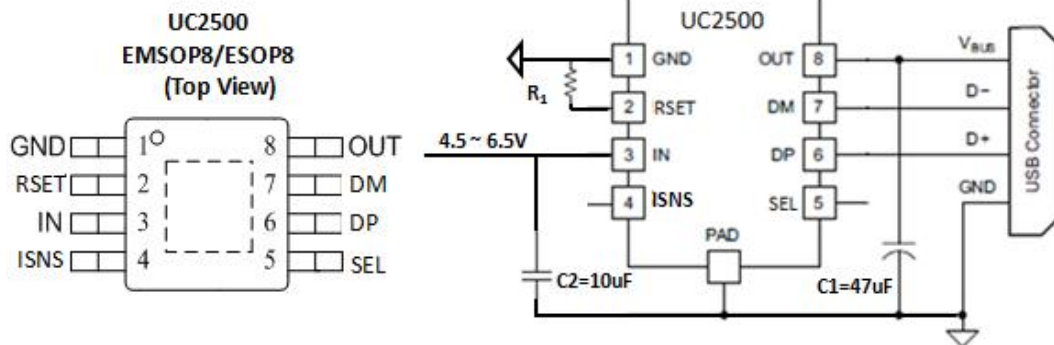
DESCRIPTION

The UC2500 integrated USB charger emulators with automatic host charger identification circuitry and high performance adjustable current limiting power switch. An automatic USB charger identification circuit allows mobile power supply can automatically provides the correct modes on the data lines to charger compliant devices among the Apple, Samsung and BC1.2 modes.

The UC2500 is a 45mΩ power switch intended for applications where heavy capacitive loads and short-circuits are likely to be encountered. This also provides hiccup mode when OUT voltage is less than 1.8V or OTSD.

The UC2500 provides a ISNS pin for current sense or USB cable resistance compensation and an SEL pin to select 10W or 12W mode in application.

PACKAGE AND APPLICATION



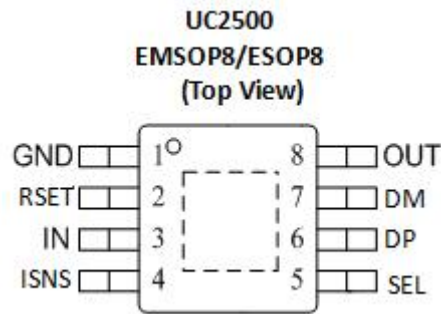
SEL = 0: Apple=2.4A, SS=2A, DCP=1.5A;
 SEL = 1 or Floating: Apple=2.1A, SS=2A, DCP=1.5A;
 ISNS is floating or pull up with 10k Resistor if not used

ORDING information

Part Number	Package Type	Package Qty	Op Temp(°C)	Mark
UC2500	EMSOP8	3000	-40~85	UC2500 XXX
	ESOP8	3000		

USB Charger Emulator with Adjustable Power Switch

PINOUT

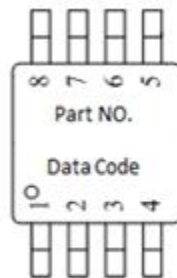


PIN FUNCTIONS

NO.	NAME	TYPE ⁽¹⁾	DESCRIPTION
1	GND	G	Ground connection
2	RSET	I	External resistor used to set current-limit threshold;
3	IN	P/I	Power supply/Input voltage connected to Power Switch; connect a 1 μF or greater ceramic capacitor from IN to GND as close to the IC as possible
4	ISNS	O	Current Sense of OUT current, the current sense ratio is 39uA/A;
5	SEL	I	Logic-level control input; When it is high or floating, DP/DM operate in 2.1A mode , when it is Low, DP/DM operate in 2.4A mode;
6	DP	O/I	DP data line to connector, output for hand-shake voltage to portable equipment, high impedance while disabled
7	DM	O/I	DM data line to connector, input for hand-shake voltage from portable equipment high impedance while disabled
8	OUT	O	Power-switch output, connected to VBUS of USB; connect a 22μF or greater ceramic capacitor from OUT to GND as close to the IC as possible

(1) G = Ground, I = Input, O = Output, P = Power

MARK INFORMATION



USB Charger Emulator with Adjustable Power Switch
ABSOLUTE MAXIMUM RATINGS ⁽¹⁾

Over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER		MIN	MAX	UNIT
Supply Voltage Range	IN	-0.3	7.0	V
Input voltage range	DP,DM	-0.3	5.8	
Continuous output sink current	DP input current, DM input current		35	mA
Continuous output source current	DP output current, DM output current		35	
ESD rating, Human Body Model (HBM)	IN		2	kV
	DP, DM		2	
Operating Junction Temperature	T _J	-40	125	°C
Storage Temperature Range	T _{stg}	-65	150	

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

THERMAL CHARACTERISTICS

over operating free-air temperature range (unless otherwise noted)

THERMAL METRIC			UNIT
θ_{JA}	EMSOP8 Package thermal impedance ⁽¹⁾	65	°C/W
	ESOP8 Package thermal impedance ⁽¹⁾	42	

(1) The package thermal impedance is calculated in accordance with JESD 51-7.

RECOMMENDED OPERATING CONDITIONS

PARAMETER		MIN	MAX	UNIT
V _{IN}	Input voltage of IN	4.5	6.5	V
V _{DP/DM}	DP data line input voltage		5.5	
I _{DP/DM}	Continuous sink/source current		±10	mA
R _{SET}	Resistance of R _{SET}	13	100	kΩ
I _{OUT}	Continuous sink/source current	500	4000	mA
T _J	Operating Junction Temperature	-40	125	°C

USB Charger Emulator with Adjustable Power Switch

ELECTRICAL CHARACTERISTICS

Conditions are: TA = 25°C, VIN = 5.0 V, VSEL = VIN and RSET = 19.1 kΩ. Positive current are into pins. All voltages are with respect to GND (unless otherwise noted).

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Power Switch						
RDSON	EMSOP8 Package	IOUT=1A	45	68	mΩ	
	ESOP8 Package		55	83		
Current Limit						
IOS	OUT current limited	BIN1: RSET=19.1k	2.45	2.74	3.03	A
		BIN2: RSET=21.5k	2.45	2.74	3.03	
Hiccup Mode						
VOUT_SHORT	OUT Threshold Voltage to enter Hiccup mode		1.3	1.50	1.7	V
TON_HICCUP	ON Time of Hiccup mode		11	22	33	ms
TOFF_HICCUP	OFF Time of Hiccup mode		5	11.5	18	s
Current Sense						
ICS	OUT current sense	IOUT=3.0A		117		uA
		IOUT=2.0A		78		
		IOUT=1.0A		39		
Bandwidth			600		kHz	
Thermal Shutdown						
	Temperature Rising Threshold		145	152	160	°C
	Hysteresis		17			

USB Charger Emulator with Adjustable Power Switch

ELECTRICAL CHARACTERISTICS

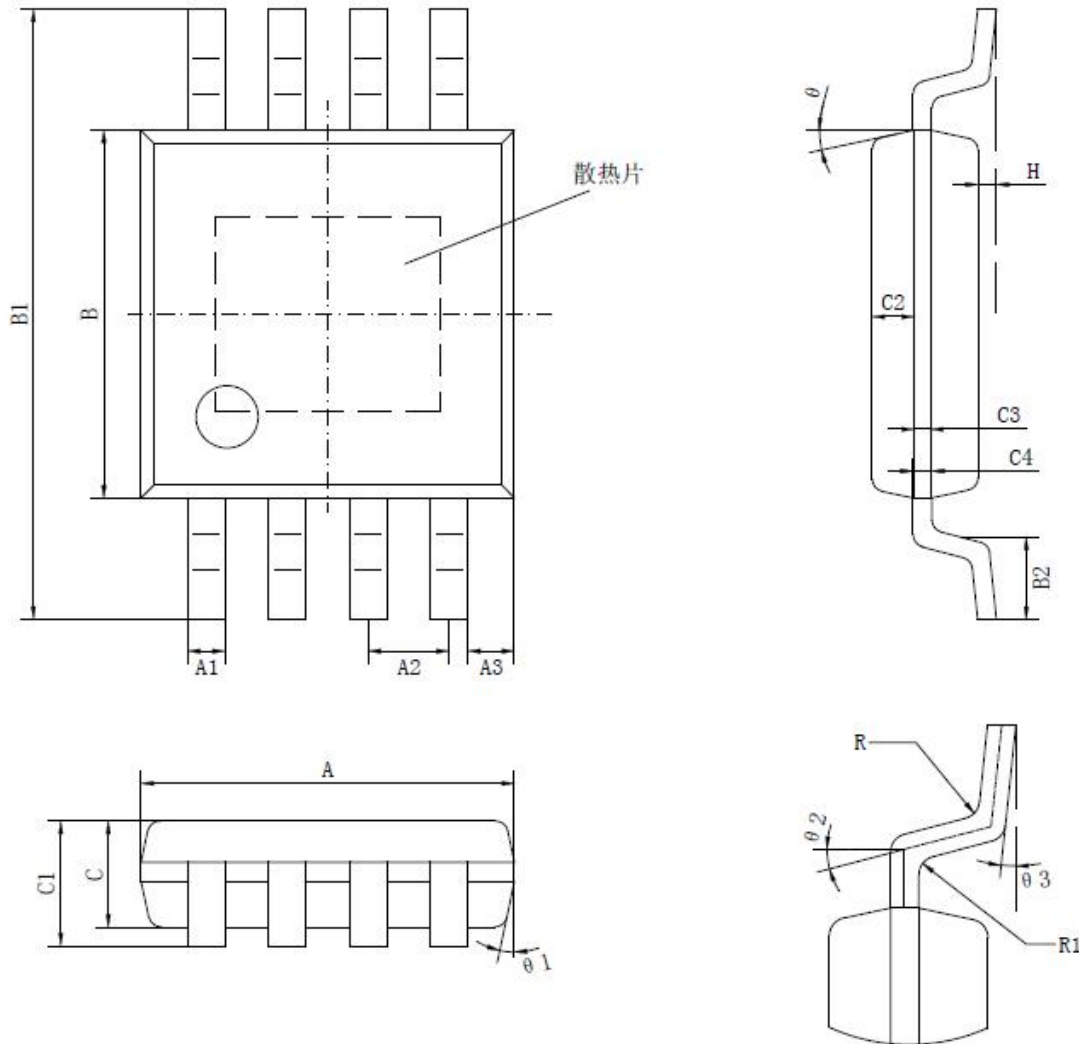
Conditions are: TA = 25°C, VIN = 5.0 V, VSEL = VIN and RSET = 19.1 kΩ. Positive current are into pins. All voltages are with respect to GND (unless otherwise noted).

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
UNDERVOLTAGE LOCKOUT						
VUVLO	IN rising UVLO threshold voltage	3.75	3.95	4.15	V	
	Hysteresis		100		mV	
SUPPLY CURRENT						
IIN	IN supply current		160	280	μA	
BC 1.2 DCP MODE (SHORT)						
RDPM_SHORT	DP / DM shorting resistance		125	200	Ω	
RDCHG_SHORT	Resistors connected DP /DM to GND after hand-shaking		200	400	kΩ	
VDPL_TH_DETACH	DP low threshold while detaching BC1.2 devices	310	330	350	mV	
VDPL_TH_DETACH_HYS	hysteresis		50		mV	
IPAD MODE 2.1A Mode (SEL=1 or Floating)						
VDP_IPAD	DP output voltage	2.5	2.7	2.9	V	
VDM_IPAD	DM output voltage	1.85	2.0	2.15	V	
RDP_IPAD	DP output impedance	IDP = -5uA	20	30	40	kΩ
RDM_IPAD	DM output impedance	IDM = -5uA	20	30	40	kΩ
IPAD MODE 2.4A Mode (SEL=0)						
VDP_IPAD	DP output voltage	2.5	2.7	2.9	V	
VDM_IPAD	DM output voltage	2.5	2.7	2.9	V	
RDP_IPAD	DP output impedance	IDP = -5uA	20	30	40	kΩ
RDM_IPAD	DM output impedance	IDM = -5uA	20	30	40	kΩ
Galaxy Tab MODE						
VDP_GAL	DP output voltage	1.1	1.2	1.3	V	
VDM_GAL	DM output voltage	1.1	1.2	1.3		
RDP_GAL	DP output impedance	IDP = -5uA	65	105	140	kΩ
RDM_GAL	DM output impedance	IDM = -5uA	65	105	140	

USB Charger Emulator with Adjustable Power Switch

PACKAGE INFORMATION

EMSOP8

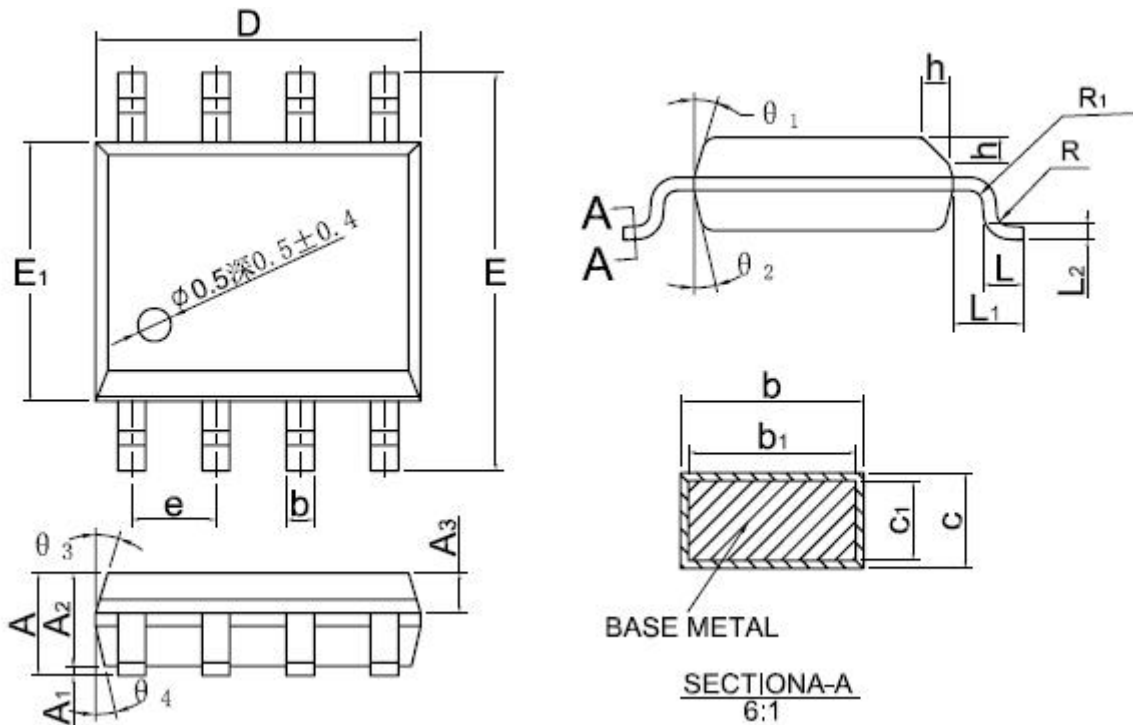


标注	尺寸	最小(mm)	最大(mm)	标注	尺寸	最小(mm)	最大(mm)
A		2.90	3.10	C3		0.152	
A1		0.28	0.35	C4		0.15	0.23
A2		0.65TYP		H		0.02	0.15
A3		0.375TYP		θ		12° TYP4	
B		2.90	3.10	θ 1		12° TYP4	
B1		4.70	5.10	θ 2		14° TYP	
B2		0.45	0.75	θ 3		0° ~ 6°	
C		0.75	0.95	R		0.15TYP	
C1		--	1.10	R1		0.15TYP	
C2		0.328TYP					

* 注: EMSOP8产品框架基岛尺寸为1.80X1.80, 散热片尺寸为1.80X1.55 (单位: mm)

USB Charger Emulator with Adjustable Power Switch

ESOP8



SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A ₁	0.00	—	0.10
A ₂	1.25	1.40	1.65
A ₃	0.50	0.60	0.70
b	0.39	—	0.49
b ₁	0.28	—	0.48
c	0.10	—	0.25
c ₁	0.10	—	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E ₁	3.80	3.90	4.00
e	1.27BSC		
L	0.45	—	1.00
L ₁	1.04REF		
L ₂	0.25BSC		
R	0.07	—	—
R ₁	0.07	—	—
h	0.3	0.4	0.5
θ ₁	0°	—	8°
θ ₂	11°	17°	19°
θ ₃	11°	13°	15°
θ ₄	15°	17°	19°
EP1	11°	13°	15°
EP1	2.40	—	—
EP2	3.30	—	—