

## USB Charger Emulator with Adjustable Power Switch and Load Detection

### FEATURES

- 45 mΩ High-Side MOSFET
- 0.5~4.0 A (typ.) Adjustable Current Limit
- Ultra-Low Load Detection
- 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
- Built-in Soft-Start
- Support single layer PCB layout.
- 4.5 ~ 6.5V Single Supply Operation.
- Available EMSOP8 package.

### APPLICATIONS

- USB Charger
- USB Wall Adapter
- Car Charger

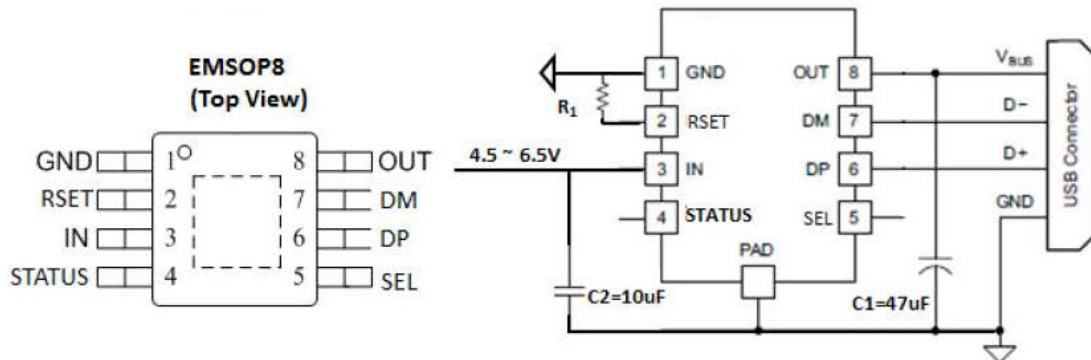
### DESCRIPTION

The HM2514 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 HM2514 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 enter OTSD.

The HM2514 provides a STATUS pin for ultra-low load detection or USB cable resistance compensation and an SEL pin to select 10W or 12W mode in application.

### PACKAGE AND APPLICATION



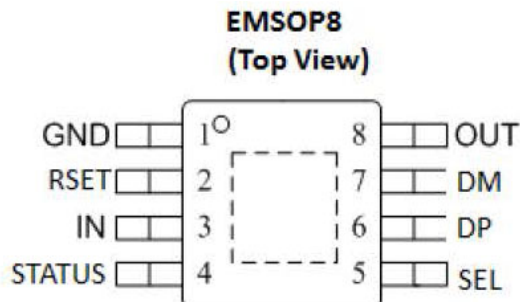
SEL = 0: Apple=2.4A, SS=2A, DCP=1.5A;  
SEL = 1 or Floating: Apple=2.1A, SS=2A, DCP=1.5A;  
STATUS is floating or pull up with 10k Resistor if not used

### ORDING INFORMATION

Part Number	Package Type	Package Qty	Op Temp(°C)	Mark
HM2514	EMSOP8	3000	-40~85	HM2514 XXXX

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### PINOUT

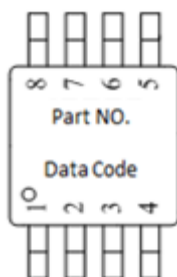


### PIN FUNCTIONS

NO.	NAME	TYPE <sup>(1)</sup>	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 $\mu$ F or greater ceramic capacitor from IN to GND as close to the IC as possible
4	STATUS	O	Active-low open-drain output, asserted when the load exceeds the load-detection threshold
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 22 $\mu$ F 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 and Load Detection

### ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>

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 <sub>J</sub>	-40	125	°C
Storage Temperature Range	T <sub>stg</sub>	-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
$\theta_{JA}$	EMSOP8 Package thermal impedance <sup>(1)</sup>	65	°C/W
	ESOP8 Package thermal impedance <sup>(1)</sup>	42	

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

### RECOMMENDED OPERATING CONDITIONS

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

## USB Charger Emulator with Adjustable Power Switch and Load Detection

### ELECTRICAL CHARACTERISTICS

Conditions are: TA = 25°C, VIN = 5.0 V, VSEL = VIN and RSET = 33.0kΩ. Positive current are into pins. All voltages are with respect to GND (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
Power Switch						
R <sub>DS(on)</sub>	EMSOP8 Package	I <sub>OUT</sub> =1A	45	68		mΩ
Current Limit						
I <sub>OUT</sub>		R <sub>set</sub> =33.0k	2.50	2.84	3.15	A
Hiccup Mode						
T <sub>ON_HICCUP</sub>	ON Time of Hiccup mode		130			ms
T <sub>OFF_HICCUP</sub>	OFF Time of Hiccup mode		1.3			s
Load Detection						
I <sub>LD_RISING</sub>	I <sub>OUT</sub> Rising Load Detection Thresold	R <sub>set</sub> =33.0k	135	195	255	mA
I <sub>LD_FALLING</sub>	I <sub>OUT</sub> Falling Load Detection Thresold		90	145	200	
T <sub>LD_SET</sub>	Load Detection Set time		128			ms
T <sub>LD_RESET</sub>	Load Detection Reset time		128			
Thermal Shutdown						
	Temperature Rising Threshold		172			°C
	Hysteresis		20			

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### ELECTRICAL CHARACTERISTICS

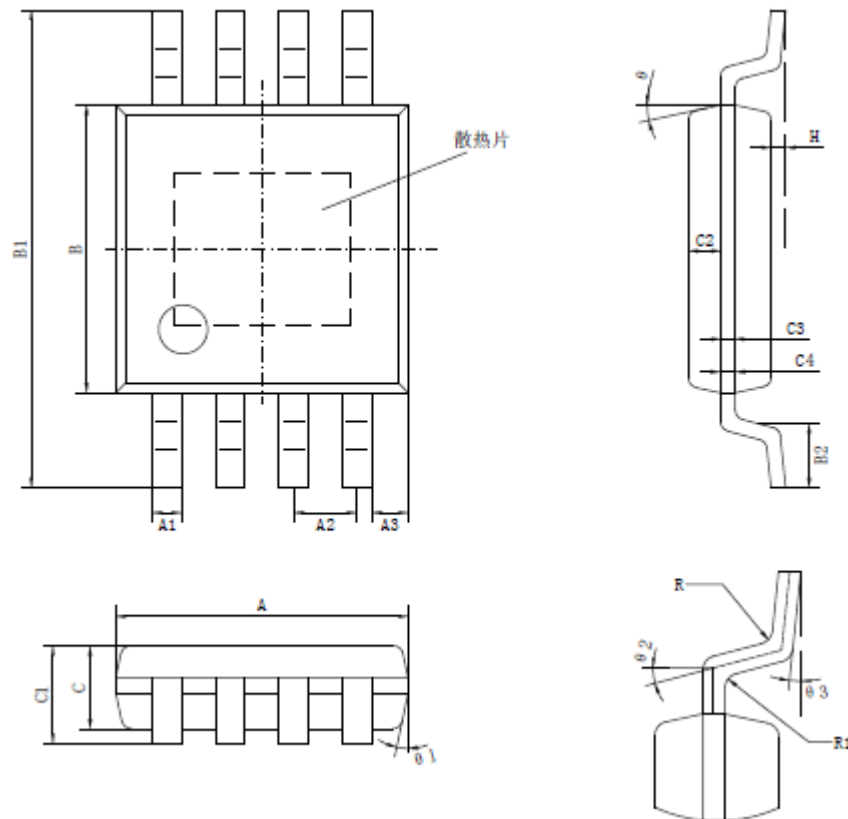
Conditions are: TA = 25°C, VIN = 5.0 V, VSEL = VIN and RSET = 33.0 kΩ. Positive current are into pins. All voltages are with respect to GND (unless otherwise noted).

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>UNDERVOLTAGE LOCKOUT</b>						
V <sub>UVLO</sub>	IN rising UVLO threshold voltage		3.75	3.95	4.15	V
	Hysteresis			100		mV
<b>SUPPLY CURRENT</b>						
I <sub>IN</sub>	IN supply current			160	350	μA
<b>BC 1.2 DCP MODE (SHORT)</b>						
R <sub>DPM_SHORT</sub>	DP / DM shorting resistance			125	200	Ω
<b>IPAD MODE 2.1A Mode (SEL=1 or Floating)</b>						
V <sub>DP_IPAD</sub>	DP output voltage		2.5	2.7	2.9	V
V <sub>DM_IPAD</sub>	DM output voltage		1.85	2.0	2.15	V
<b>IPAD MODE 2.4A Mode (SEL=0)</b>						
V <sub>DP_IPAD</sub>	DP output voltage		2.5	2.7	2.9	V
V <sub>DM_IPAD</sub>	DM output voltage		2.5	2.7	2.9	V
<b>Galaxy Tab MODE</b>						
V <sub>DP_GAL</sub>	DP output voltage		1.1	1.2	1.3	V
V <sub>DM_GAL</sub>	DM output voltage		1.1	1.2	1.3	

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**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	θ1		12° TYP4	
B1		4.70	5.10	θ2		14° TYP	
B2		0.45	0.75	θ3		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)