DESCRIPTION

The A7545 is a current mode boost DC-DC converter. It is PWM circuitry with built-in 0.05Ω power MOSFET make this regulator highly power efficient. The internal compensation network also minimizes as much as 6 external component counts. The non-inverting input of error amplifier connects to a 0.6V precision reference voltage and internal soft-start function can reduce the inrush current.

The A7545 is available in PSOP8 package.

ORDERING INFORMATION

Package Type		Part Number
PSOP8	MP8	A7545MP8R
		A7545MP8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products Suffix " V " means Halogen free Package		

FEATURES

● Adjustable Output up to 9V

● Internal Fixed PWM frequency: 1MHz

● Precision Feedback Reference Voltage: 0.6V (±2%)

● Internal 0.05Ω, 4.5A, 12V Power MOSFET

● Shutdown Current: 0.1µA

● Over Temperature Protection

● Over Voltage Protection

● Adjustable Over Current Protection: 0.5A ~ 4.5A

● Available in PSOP8 Package

APPLICATION

● Chargers

● LCD Displays

● Digital Cameras

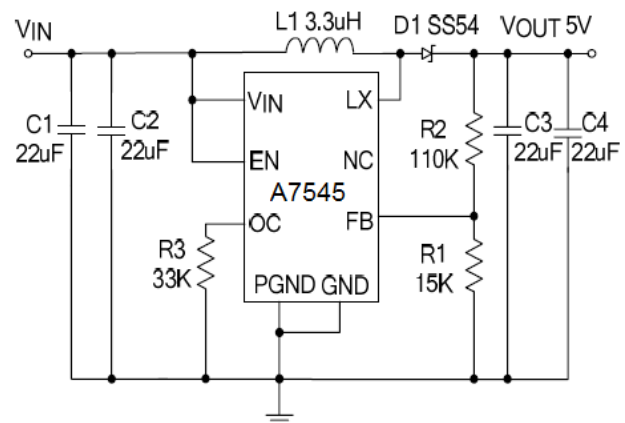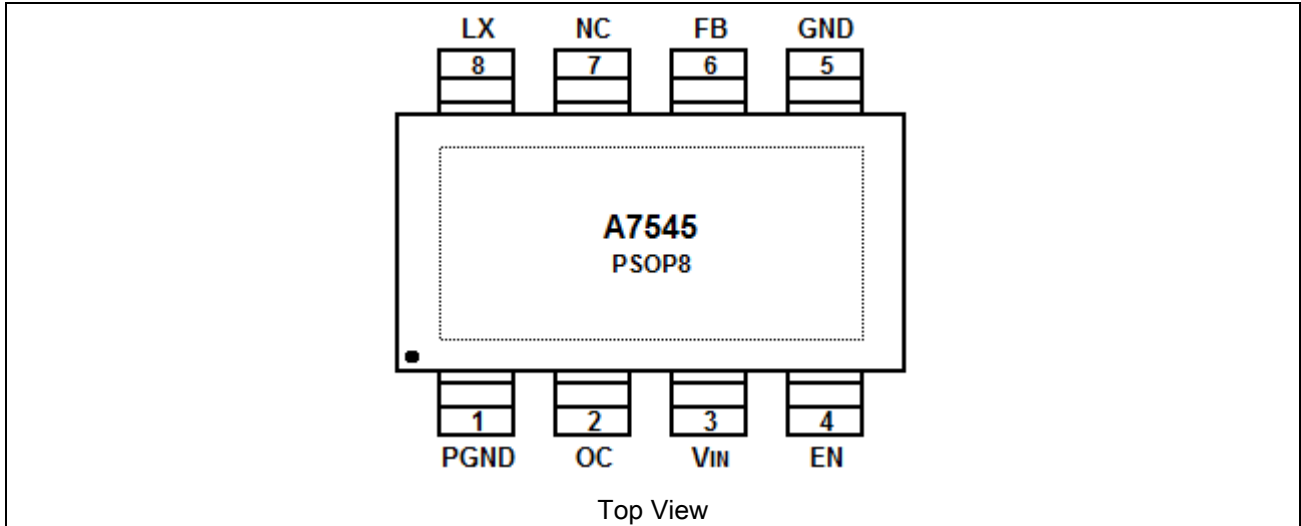● Handheld Devices

● Portable Products

TYPICAL APPLICATION

Figure 1. Basic Application Circuit with A7545

PIN DESCRIPTION

Top View

Pin #	Symbol	Function
1	PGND	IC Ground.
2	OC	Adjustable Current Limit (Floating Available).
3	V_{IN}	IC Power Supply.
4	EN	Enable Control (Active High).
5	GND	IC Ground.
6	FB	Error Amplifier Inverting Input.
7	NC	Not Connected.
8	LX	Power Switch Output.

ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage	-0.3V~+6V
SW Voltage	-0.3V~+12V
FB, EN Voltages	-0.3V~+6V
Operating Temperature Range	-40°C ~+85°C
Storage Temperature Range	-65°C~150°C
Lead Temperature (Soldering, 10s)	+260°C

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS[NOTE1]

V_{CC} =3.3V, T_A = 25°C, Test Circuit of Figure 1, unless otherwise noted.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Supply Range	V_{CC}		2.5		5.5	V
Under Voltage Lockout	V_{UVLO}			2.2		V
UVLO Hysteresis				0.1		V
Quiescent Current	I_{CC}	V_{FB}=0.66V, No switching		0.2		mA
Average Supply Current	I_{CC}	V_{FB}=0.55V, Switching		6.5		mA
Shutdown Supply Current	I_{CC}	V_{EN}=GND		0.1		µA
Operation Frequency	F_{OSC}			1		MHz
Frequency Change with Voltage	$\Delta f/\Delta V$	V_{CC}=2.5V to 5.5V		5		%
Maximum Duty Cycle	T_{DUTY}			90		%
Reference Voltage	V_{REF}		0.588	0.6	0.612	V
Line Regulation		V_{CC}=2.5V to 5.5V		0.2		%/V
Enable Voltage	V_{EN}		0.96			V
Shutdown Voltage	V_{EN}				0.6	V
On Resistance of Driver	$R_{DS(ON)}$	I_{LX}=2A		0.05		Ω
OCP Current	I_{OCP}			6		A
Adjustable OCP Current	I_{OCP}	With External Resistor: 33k~909k	0.5		4.5	A
OTP Temperature	T_{OTP}			150		°C

NOTE1: 100% production test at +25°C. Specifications over the temperature range are guaranteed by design and characterization.

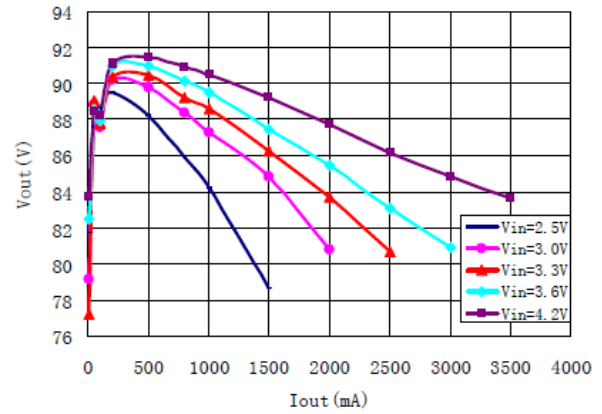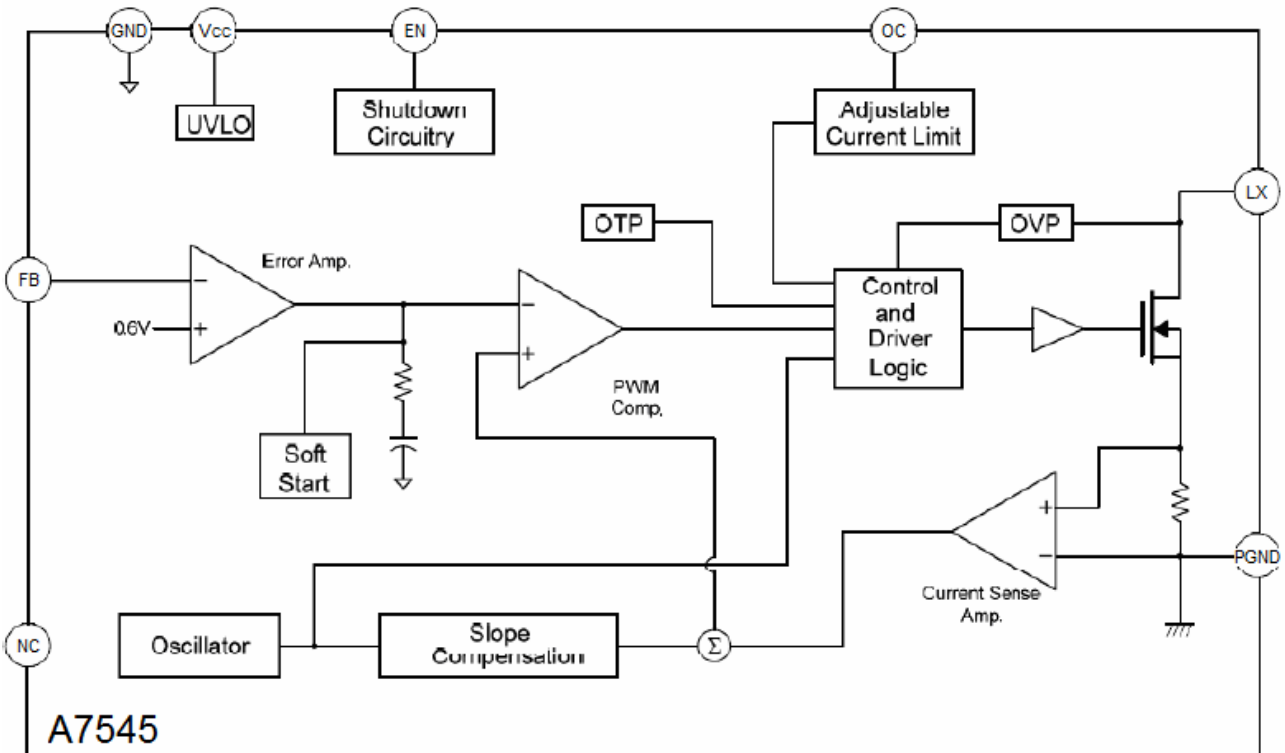## TYPICAL PERFORMANCE CHARACTERISTICS

1. Imax vs. V_{IN}(V_O=5.3V)
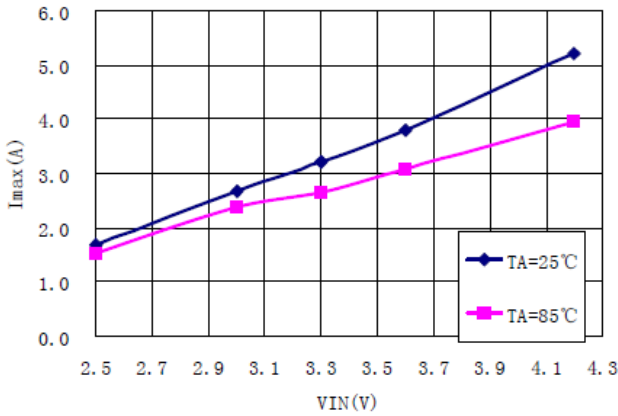
2. η vs. I_O(V_O=5.3V)

BLOCK DIAGRAM

DETAILED INFORMATION

Operation

The A7545 is a current mode boost converter. The switching frequency is 1MHz and operates with pulse width modulation (PWM). Build-in 12V / 4.5A MOSFET provides a high output voltage. The control loop architecture is peak current mode control; therefore slope compensation circuit is added to the current signal to allow stable operation for duty cycles larger than 50%.

Soft Start Function

Soft start circuitry is integrated into A7545 to avoid inrush current during power on. After the IC is enabled, the output of error amplifier is clamped by the internal soft-start function, which causes PWM pulse width increasing slowly and thus reducing input surge current.

Current Limit Program

A resistor between OC and GND pin programs peak switch current. The resistor value should be between 26k to 500k. The current limit will be set from 4.5A to 0.5A. Keep traces at this pin as short as possible. Do not put capacitance at this pin. To set the over current trip point according to the following equation:

$$I_{OCP} = \frac{135000}{R3} + 0.35$$

Over Temperature Protection (OTP)

A7545 will turn off the power MOSFET automatically when the internal junction temperature is over 150°C. The power MOSFET wake up when the junction temperature drops 30°C under the OTP threshold temperature.

Over Voltage Protection (OVP)

In some condition, the resistive divider may be unconnected, which will cause PWM signal to operate with maximum duty cycle and output voltage is boosted higher and higher. The power MOSFET will be turned off immediately, when the output voltage exceeds the OVP threshold level. The A7545's OVP threshold is 12V.

Application Information

Inductor Selection

Inductance value is decided based on different condition. 3.3uH to 4.7µH inductor value is recommended for general application circuit. There are three important inductor specifications, DC resistance, saturation current and core loss. Low DC resistance has better power efficiency.

Capacitor Selection

The output capacitor is required to maintain the DC voltage. Low ESR capacitors are preferred to reduce the output voltage ripple. Ceramic capacitor of X5R and X7R are recommended, which have low equivalent series resistance (ESR) and wider operation temperature range.

Diode Selection

Schottky diodes with fast recovery times and low forward voltages are recommended. Ensure the diode average and peak current rating exceed the average output current and peak inductor current. In addition, the diode's reverse breakdown voltage must exceed the output voltage.

Output Voltage Programming

The output voltage is set by a resistive voltage divider from the output voltage to FB. The output voltage is:

$$V_{OUT} = 0.6V \times \left(1 + \frac{R2}{R1}\right)$$

Layout Consideration

For best performance of the A7545, the following guidelines must be strictly followed.

- Input and Output capacitors should be placed close to the IC and connected to ground plane to reduce noise coupling.
- The GND should be connected to a strong ground plane for heat sinking and noise protection.
- Keep the main current traces as possible as short and wide.
- SW node of DC-DC converter is with high frequency voltage swing. It should be kept at a small area.
- Place the feedback components as close as possible to the IC and keep away from the noisy device.

PACKAGE INFORMATION

Dimension in PSOP8 Package (Unit: mm)
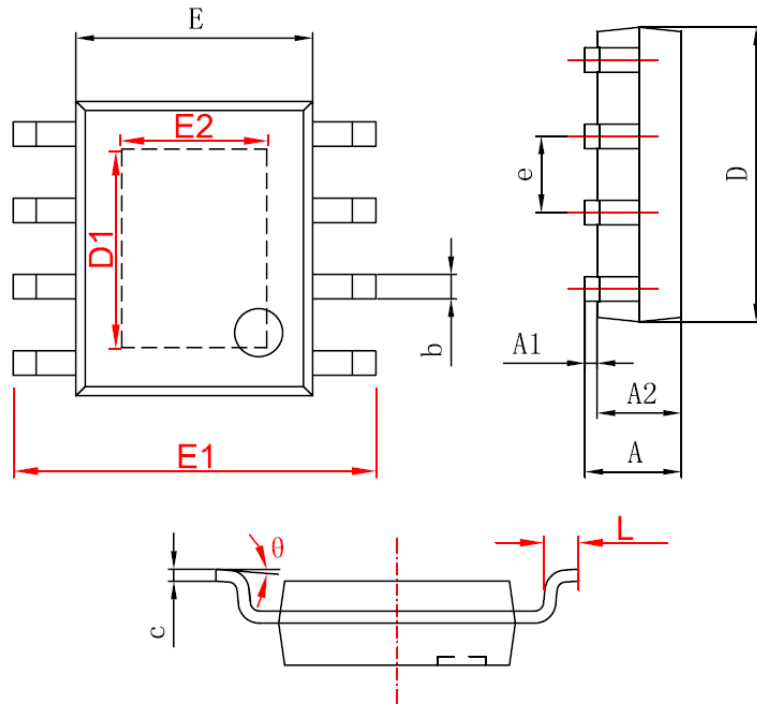
Symbol	Min	Max
A	1.350	1.750
A1	0.050	0.150
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
D1	3.202	3.402
E	3.800	4.000
E1	5.800	6.200
E2	2.313	2.513
e	1.270(BSC)	
L	0.400	1.270
θ	0°	8°

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