

1.2MHZ, 14V Step-up DC/DC Converter

GENERAL DESCRIPTION

The JTM2204D is a high frequency, high efficiency DC to DC converter with an integrated 4A, 0.1Ω power switch capable of providing an output voltage up to 14V. The fixed 1.2MHz allows the use of small external inductions and capacitors and provides fast transient response. It integrates Soft start, Comp., only need few components outside.

FEATURES

- 1.6V to 6V input voltage Rangel
- Efficiency up to 96%
- 14V Boost converter with 4A switch current
- 1.2Mhz fixed Switching Frequency
- Integrated soft-start
- Thermal Shutdown
- Under voltage Lockout
- ESD 8KV Pass(HBM)
- 8-Pin SOP-PP Package

APPLICATIONS

- Handheld Devices
- GPS Receiver
- Digital Still Camera
- Portable Applications
- DSL Modem
- PCMCIA Card
- TFT LCD Bias Supply

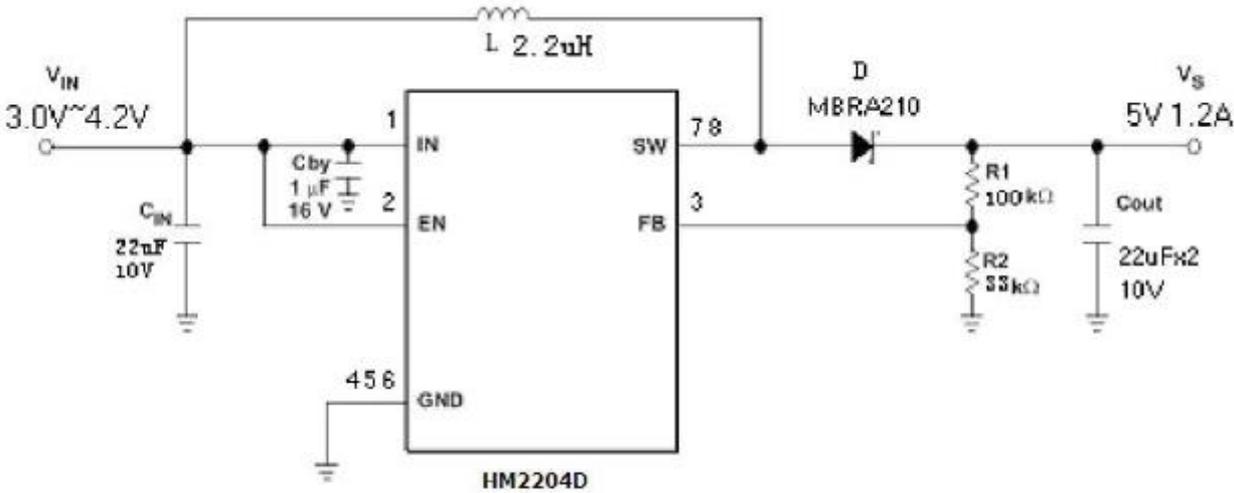


Figure 1. Typical Application Circuit1

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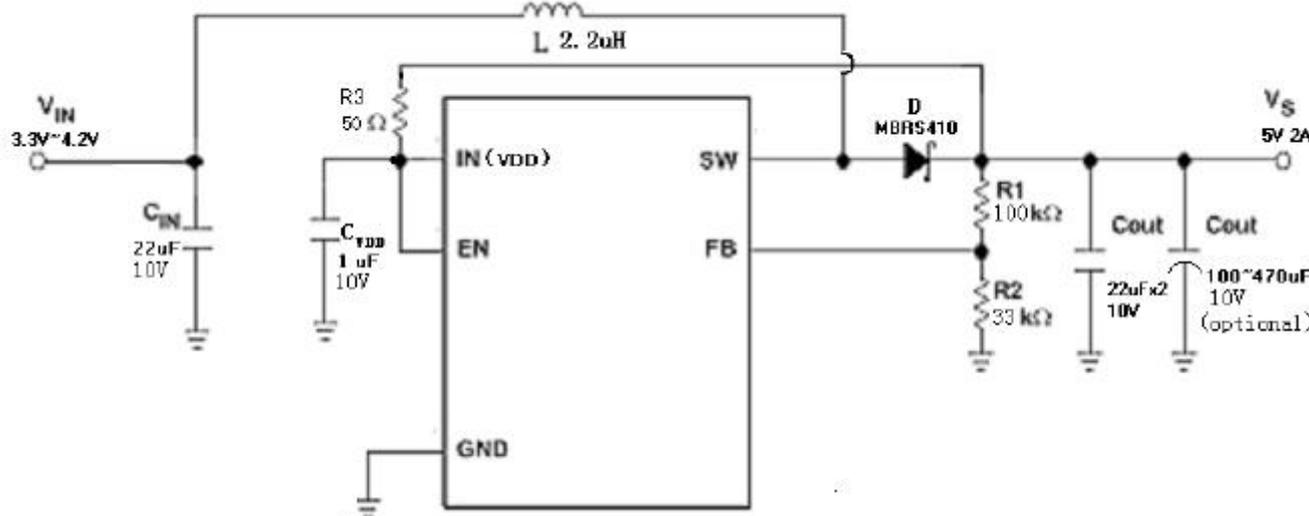


Figure 2 Typical Application Circuit2

ORDERING INFORMATION

PART NUMBER	TEMP RANGE	SWITCHING FREQUENCY	OUTPUT VOLTAGE (V)	ILIM (A)	PACKAGE	PINS
JTM2204D	-40°C to 85°C	1.2MHZ	DJA	4	SOP-PP	8

PIN CONFIGURATION

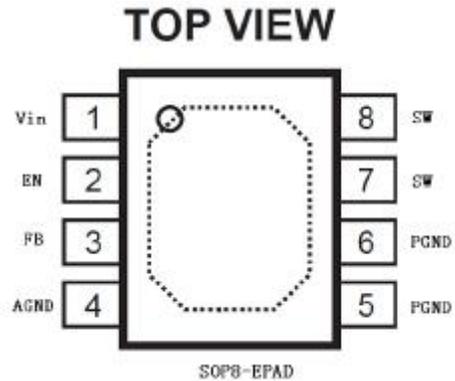


Figure 3. PIN Configuration

PIN DESCRIPTION

PIN NUMBER	PIN NAME	PIN DESCRIPTION
1	Vin	Input power supply pin
2	EN	Shutdown control input., Connect this pin to logic high level to enable the device

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3	FB	Feedback pin
4	AGND	Analog ground
5	PGND	Power ground
6	PGND	Power ground
7	SW	Switch pin
8	SW	Switch pin

ABSOLUTE MAXIMUM RATINGS

(Note: Do not exceed these limits to prevent damage to the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

PARAMETER	VALUE	UNIT
Supply Voltage V_{IN}	-0.3 to 6.5	V
FB, EN Voltage	-0.3 to $V_{IN}+0.3$	V
SW Voltage	$V_{IN}+0.3$ to 15V	V
Operating Ambient Temperature	-40 to 85	°C
Maximum Junction Temperature	150	°C
Storage Temperature	-55 to 150	°C
Lead Temperature (Soldering, 10 sec)	300	°C

ELECTRICAL CHARACTERISTICS

($V_N = 3.6V$, $T_A = 25^\circ C$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	V_{IN}		1.6		6.0	V
Boost output voltage range	V_{out}		14			V
Operating Supply Current	I_{SUPPLY}	$V_{FB} = 1.5V$, $EN = V_{in}$, $I_{Load} = 0$		75	135	μA
Shutdown Supply Current		$V_{EN} = 0V$, $V_{IN} = 4.2V$		0.1	1	
Regulated Feedback Voltage	V_{FB}		1.21	1.24	1.27	V
Peak Inductor Current	I_{PEAK}		4.0			A
Oscillator Frequency	F_{OSC}		0.9	1.2	1.5	MHz
Rds(ON) of N-channel FET		$I_{SW} = -100mA$		0.1	0.2	OJT
Enable Threshold		$V_{IN} = 1.6V$ to $5.5V$	0.3	1	1.5	V

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Enable Leakage Current			-0.1	0.1	μA
SW Leakage Current		$V_{\text{EN}} = 0\text{V}$, $V_{\text{SW}} = 0\text{V}$ or 5V , $V_{\text{IN}} = 5\text{V}$		1	μA

DETAILED DESCRIPTION

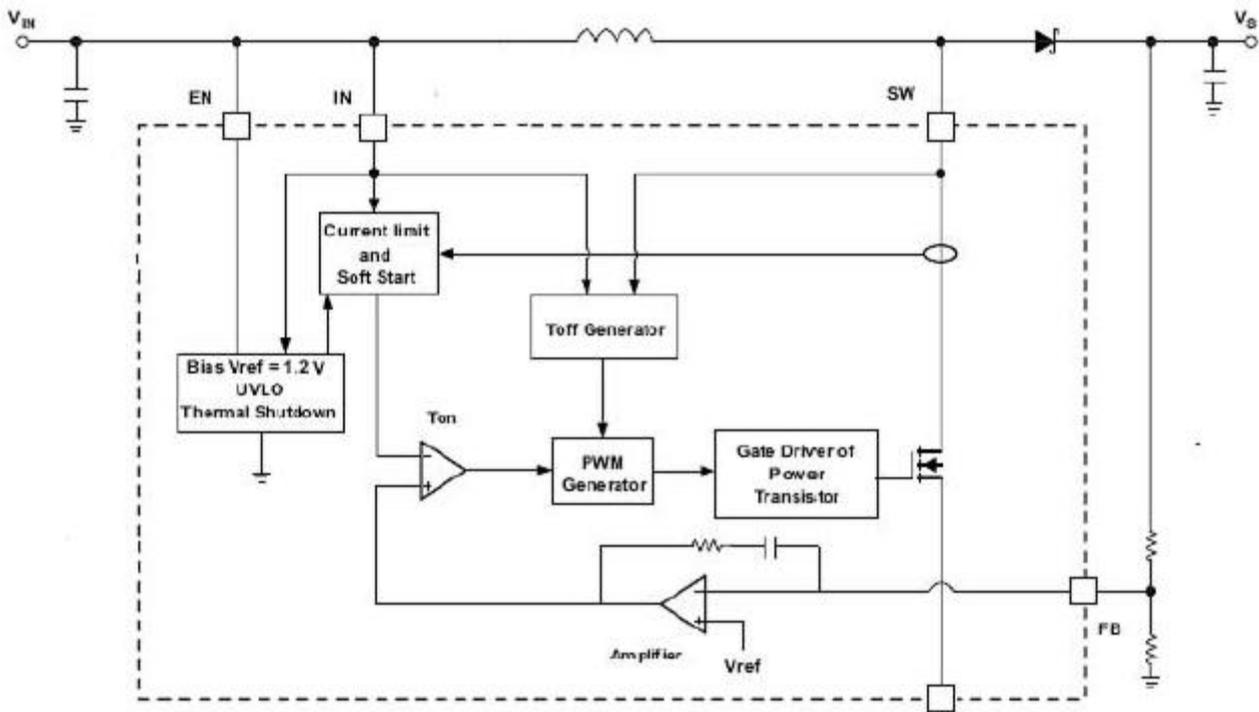


Figure 4. Functional Block Diagram

FUNCTIONAL DESCRIPTION

NORMAL OPERATION

The boost converter is designed for output voltage up to 14V with a switch peak current limit of 4.0 A. The device, which operates in a current mode scheme with quasi-constant frequency, is externally 1.2MHz and the minimum input voltage is 1.6 V. To control the inrush current at start-up a soft-start pin is available.

During the on-time, the voltage across the inductor causes the current in it to rise. When the current reaches a threshold value set by the internal GM amplifier, the power transistor is turned off, the energy stored into the inductor is then released and the current flows through the Schottky diode towards the output of the boost converter. The off-

time is fixed for a certain V_{in} and V_{s} , and therefore maintains the same frequency when varying these parameters.

However, for different output loads, the frequency may slightly change due to the voltage drop across the $R_{\text{ds(on)}}$ of the power transistor which will have an effect on the voltage across the inductor and thus on T_{on} (T_{off} remains fixed).

Some slight frequency changes might also appear with a fixed output load due to the fact that the output voltage V_{s} is not sensed directly but via the SW Pin, which affects accuracy.

Because of the quasi-constant frequency behavior of the device, the JTM2204D eliminates the need for an internal oscillator and slope

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compensation, which provides better stability for the system over a wide of input and output voltages range, and more stable and accurate current limiting operation compared to boost converters operating with a conventional PWM scheme .The JTM2204D topology has also the benefits of providing very good load and line regulations, and excellent load transient response.

THERMAL SHUTDOWN

A thermal shutdown is implemented to prevent damages due to excessive heat and power dissipation. Typically the thermal shutdown threshold is 150°C .When the thermal shutdown is triggered the device stops switching until the temperature falls below typically 136°C .Then the device starts switching again.

APPLICATION INFORMATION

INDUCTOR SELECTION

In normal operation, the inductor maintains continuous current to the output. The inductor current has a ripple that is dependent on the inductance value. The high inductance reduces the ripple current.

Selected inductor by actual application:

Manufacturer	Part Number	Inductance (uH)	DRC max (OJTM s)	Dimensions L*W*H(mm3)
Murata	LQH44PN	2.2	0.049	4*4*1.7
		3.3	0.065	
		4.7	0.08	
		10	0.16	
	LQH5BP	2.2	0.030	5*5*2
		3.3	0.044	
		4.7	0.058	
		10	0.106	
TDK	SPM6530T	2.2	0.017	7.1*6.5*3
		3.3	0.027	
		4.7	0.036	
	VLP6045 LT	2.2	0.020	6*6*4.5
		3.3	0.025	
		4.7	0.029	
		10	0.055	
	WURTH	744373 24022	2.2	0.061
744777004		4.7	0.025	7.3*7.3*4.5

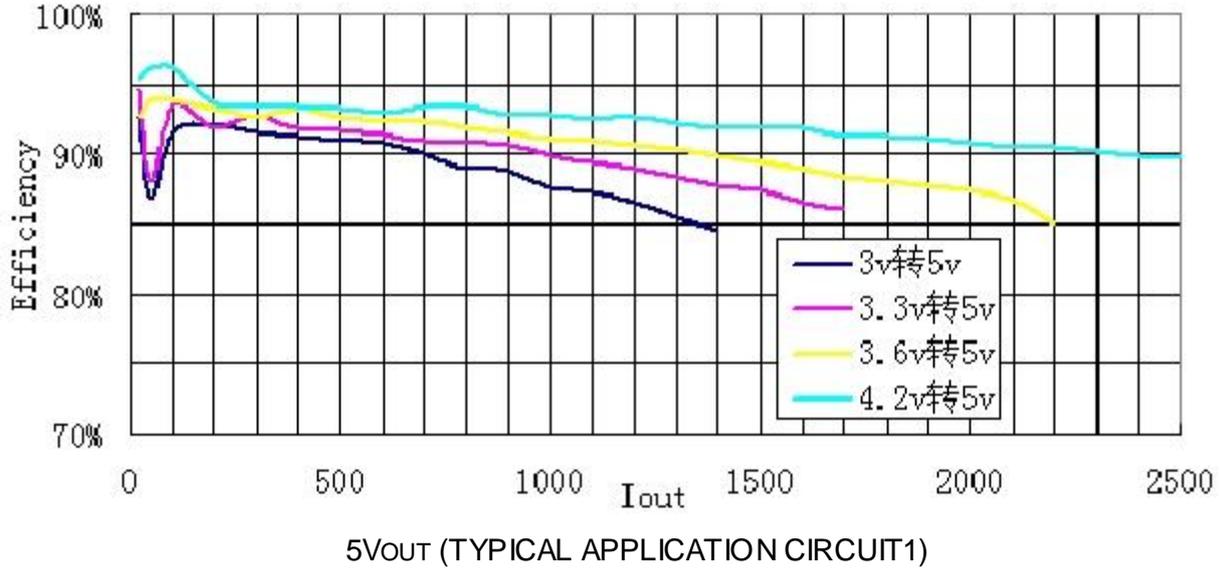
Table 1. Recommend Surface Mount Inductors

If output voltage is 5V , you can use 2.2uH- 4.7uH, If output voltage is 12V, 4.7uH- 10uH is OK.

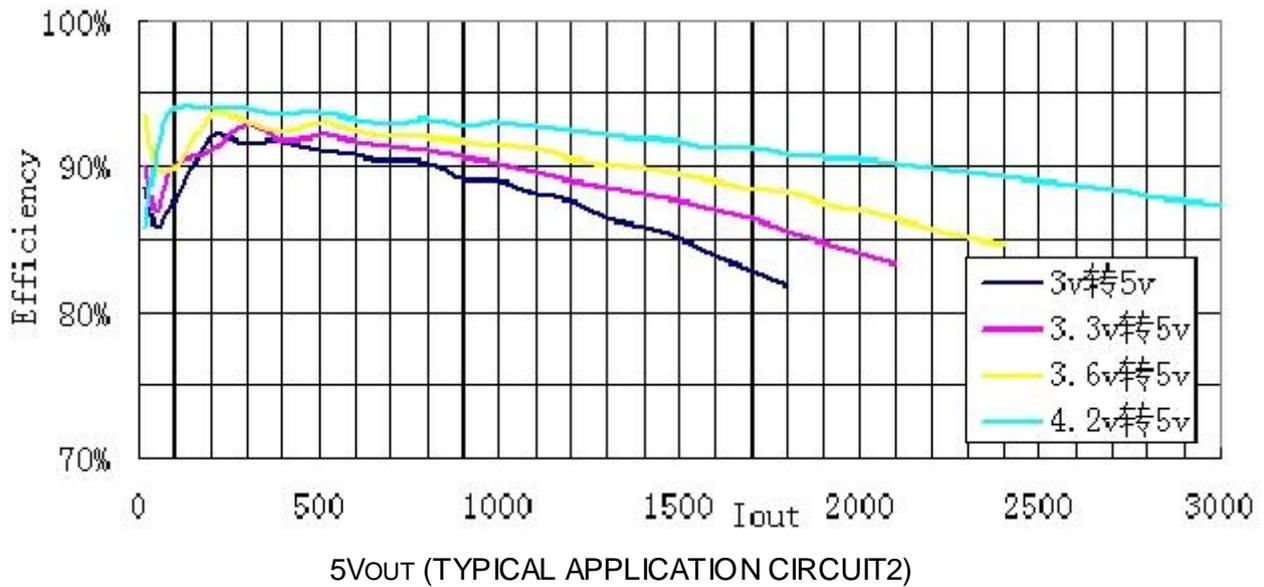
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TYPICAL PERFORMANCE CHARACTERISTICS

(L=2.2uH-SPM6530T2R2, CIN=22uF, COUT=22uFx2, D=MBRA210LT3 Vin=3.6V Vout=5V if not mentioned)



5Vout (TYPICAL APPLICATION CIRCUIT1)

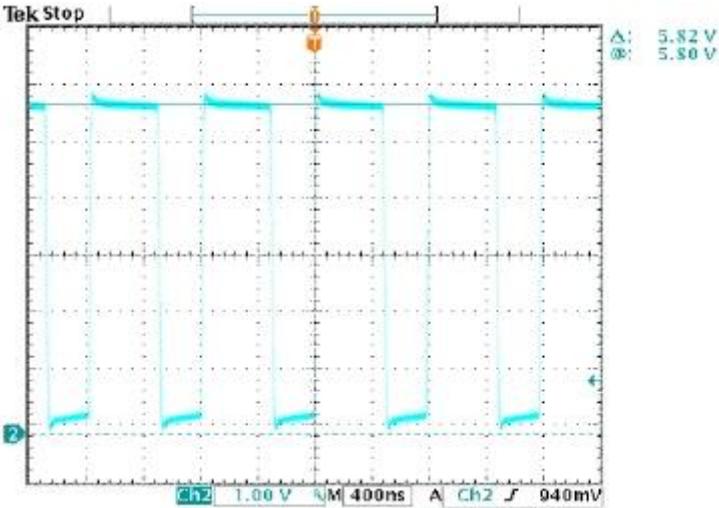


5Vout (TYPICAL APPLICATION CIRCUIT2)

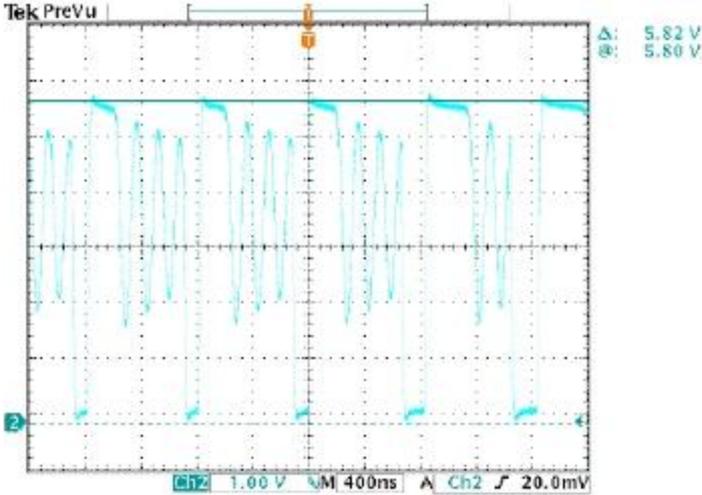
NOTES:

The efficiency is tested under normal temperature, the actual current driver capability is 70% ~90% of the max current in sheet consider of high temperature surrounding status

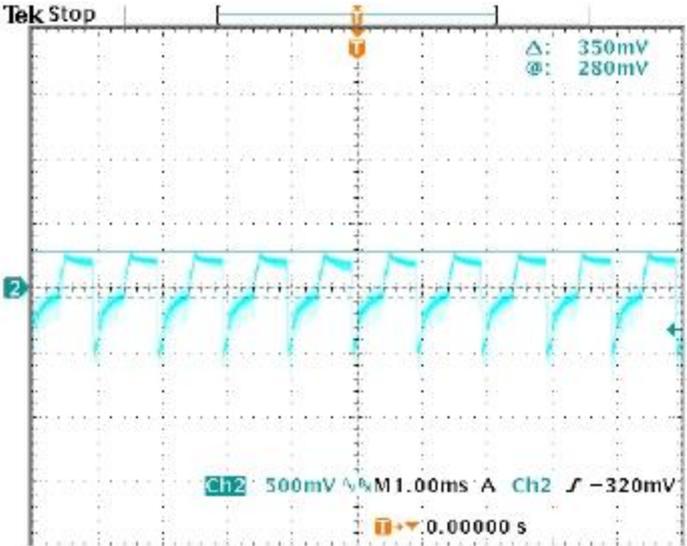
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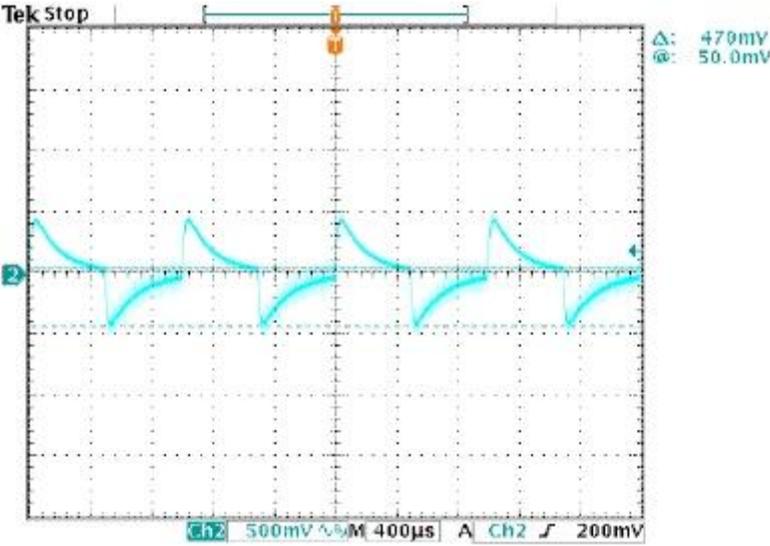
PWM SWITCHING CONTINUOUS CONDUCTION MODE



PWM SWITCHING DISCONTINUOUS CONDUCTION MODE



LOAD TRANSIENT WAVE(5V_{OUT} 0A~1A)

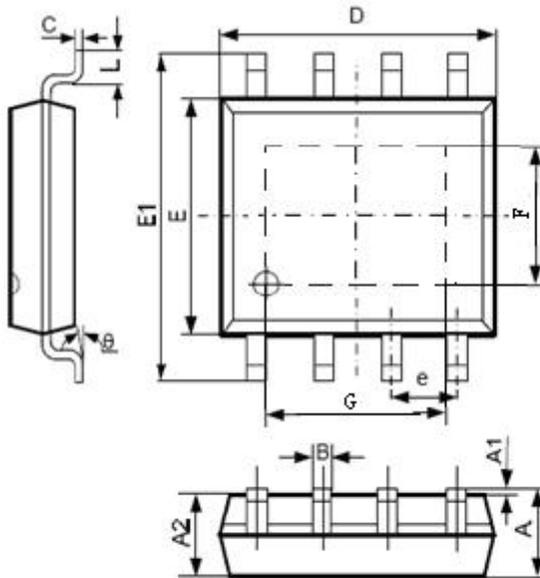


LOAD TRANSIENT WAVE(5V_{OUT} 0.2A~1A)

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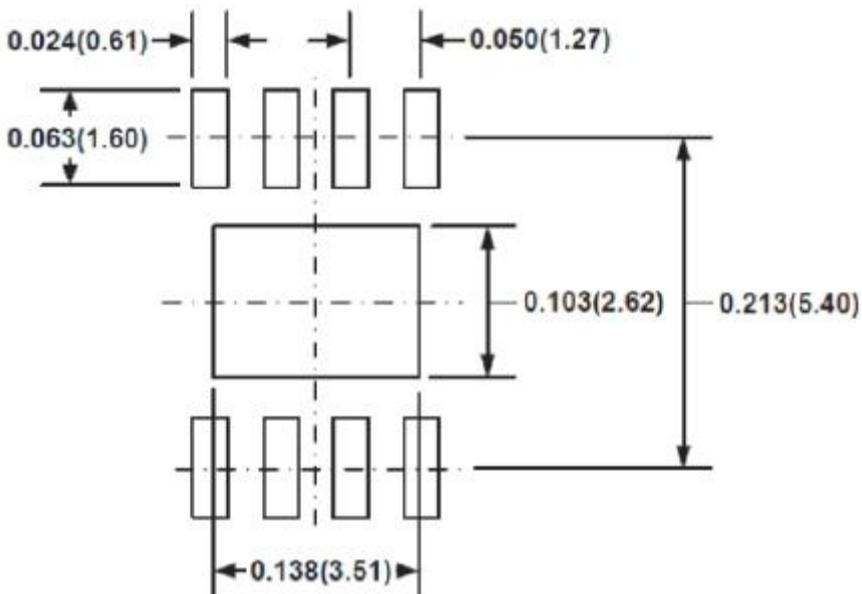
PACKAGE OUTLINE

SOP8-PP PACKAGE OUTLINE AND DIMENSIONS



SYMBOL	Dimension in Millimeters		Dimension in Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.27 TYP		0.050 TYP	
L	0.400	1.270	0.016	0.050
	0°	8°	0°	8°
F	2.26	2.56	0.089	0.101
G	3.15	3.45	0.124	0.136

In order to increase the driver current capability of XR2204 and improve the temperature of package, Please ensure Epad and enough ground PCB to release energy.



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PROUCT CHANGE NOTICE LIST

NO	Updated date	Version update	Update content
1	2012-8-22	Rev 0.1	Create datasheet
2	2012-10-24	Rev 0.2	Add capacity selection
3	2012-11-30	Rev 0.3	Update Electrical Characteristics
4	2013-5-20	Rev 0.4	Update Typical Application Circuit2
5	2014-1-21	Rev 0.5	Update input voltage range