General Description

The EC3121 is a low noise and high accuracy, high ripple rejection ratio, low dropout, dual CMOS LDO voltage regulators with enable function. The EN function allows the output of each regulator to be turned off independently, resulting in greatly reduced power consumption.

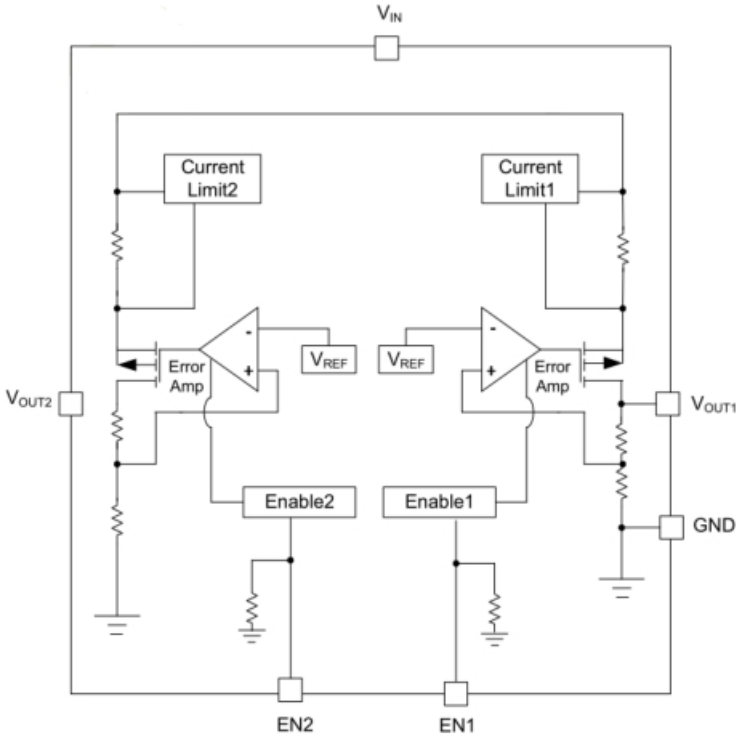
The current limit of EC3121 is over 350mA per channel and also operates as a short protection for the output current limiter. The output voltage for each regulator is set independently by metal trimming.

The EC3121 comes with low design cost and outstanding output stability and its compatibility of working with low ESR ceramic capacitors is undoubted. This high level output stability is maintained even during frequent load fluctuations, due to the excellent transient response performance and high PSRR achieved across a broad range of frequency, so these ICs are suitable for hand-held communication equipment power supply.

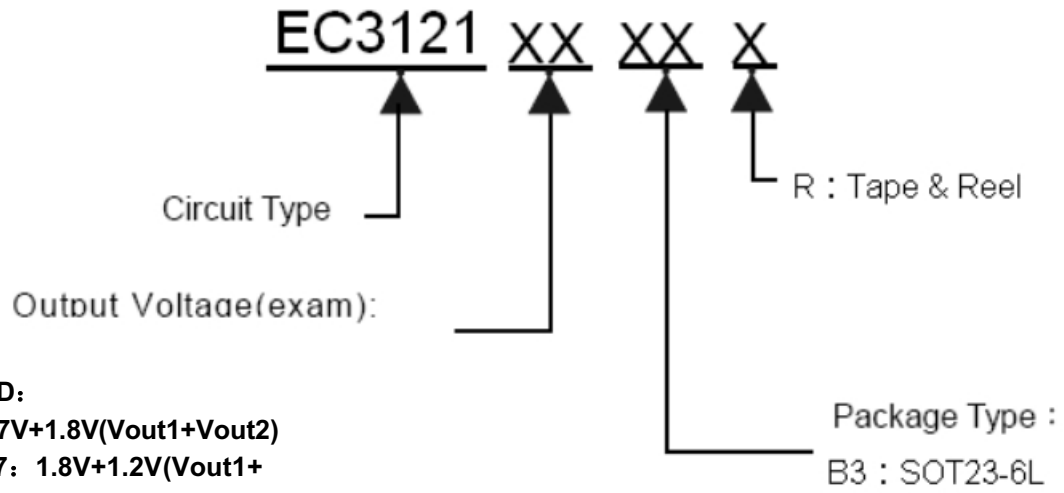
Features

- Input Voltage Range: 2.5V to 6.0V
- Varied Fixed Output Voltage Combinations
- 150mV Dropout at 100mA Output Current ($V_{OUT} \geqq 2.8V$)
- Low Quiescent Current
- Standby Current： 1uA(Typ.)
- Current Limit and Short Current Protections
- Fast Transient Response
- Low ESR Capacitor Compatible(X7R,X5R)
- Available in the 6-Pin Pb-Free SOT23-6L Packages

Function Block Diagram



Ordering Information

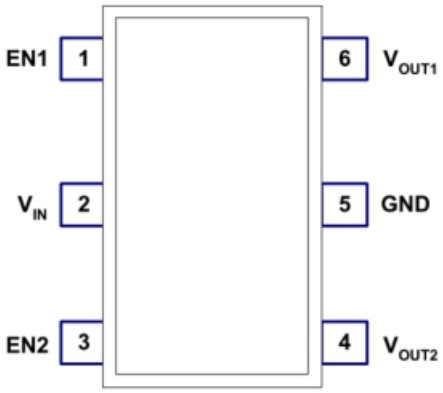


MD：
2.7V+1.8V(Vout1+Vout2)
D7：1.8V+1.2V(Vout1+
Vout2) DS：
1.8V+3.3V(Vout1+Vout2)
7D：1.2V+1.8V(Vout1+
Vout2) 7S：
1.2V+3.3V(Vout1+Vout2) DM：
1.8V+2.7V(Vout1+Vout2) DN：
1.8V+2.8V(Vout1+Vout2)
AS：1.5V+3.3V(Vout1+Vout2)

Marking Information

Device	Marking Information	Package Type	Remarks
EC3121VVB3R	3121 VVYW	SOT23-6L	1. VV：Output Voltage(Ex：AN：1.5V+2.8V;DN：1.8V+2.8V) 2. Y：Year code(D=2013;E=2014;F=2015…) 3. W ： Week Code(The big character of A~Z is for the week of 1~26, and small a~z is for the week of 27~52.)

Pin Configurations



Absolute Maximum Ratings (Note1)

Power Input Voltage (V_{IN}): (GND-0.3)~6V

Enable Voltage (V_{EN1}/V_{EN2}): (GND-0.3)~V_{IN}

Output Voltage(V_{OUT1}+V_{OUT2}) (GND-0.3)~V_{IN}

Storage Temperature Range(T_{STG}): -40℃ to 150℃

Thermal Information(Note2):

Thermal Resistance

Junction to Ambient(θ_{JA})

SOT23-6L 250° C/W

Junction to Case(θ_{JC})

SOT23-6L 180℃/W

Power Dissipation, P_D @ T_A=25° C (Note 3)

SOT23-6L 250mW

Recommended Operating Conditions(Note 4)

Operating Junction Temperature Range(T_J): -40℃ to +150℃

Operating Ambient Temperature Range(T_{OPA}): -40℃ to +85℃

Note 1:Stresses listed as the above “Absolute Maximum Ratings” may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

Note 2:Thermal Resistance is specified with approximately 1 square of 1 oz copper.

Note 3:Thermal Resistance is specified with the component mounted on a low effective thermal conductivity test board in free air at T_A=25°C.

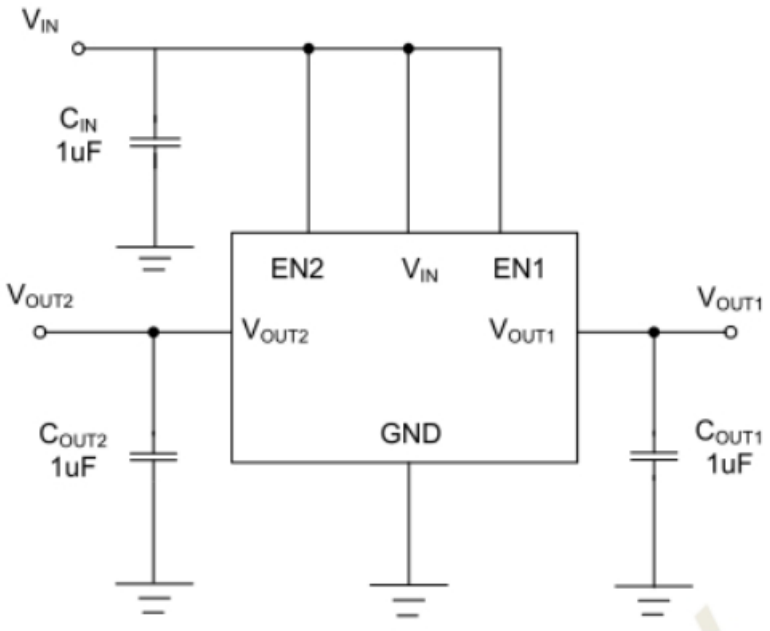
Note 4:The device is not guaranteed to function outside its operating conditions.

Electrical Characteristics (Unless otherwise noted , T_A=25°C)

Symbol	Parameters	Condition	Min	Typ	Max	Units
V_{IN}	Input Voltage		2.5		5.5	V
ΔV_{OUT}	Output Voltage Accuracy	I_{OUT}=1mA,V_{IN}=5V V_{OUT}>2.0V	-2		2	%
		I_{OUT}=1mA,V_{IN}=5V V_{OUT}≦2.0V	-0.04		0.04	V
I_{CC}	Quiescent Current	$I_{OUT1,OUT2}$=0mA,V_{IN}=5V		60	100	uA
V_{DROP}	Dropout Voltage(Note 5)	I_{OUT}=0.2A,V_O=V_O-2%,V_{OUT}=1.5V		100	1200	mV
		I_{OUT}=0.2A,V_O=V_O-2%,V_{OUT}=1.8V		700	900	mV
		I_{OUT}=0.2A,V_O=V_O-2%,V_{OUT}>2.5V		300	400	mV
I_{SC}	Short Circuit Current	V_{OUT}<1.0V,each channel		150		mA
ΔV_{LINE}	Line Regulation	I_{OUT}=1mA,V_{IN}=V_{OUT}+1V to 6.0V		0.2	0.3	%/V
ΔV_{LOAD}	Load Regulation	I_{OUT}=1~100mA,V_{IN}=V_{OUT}+1V		0.01	0.03	%/mA
PSRR	Ripple Rejection	f=10kHz, Ripple 0.5V_{P-P}, V_{OUT}>1.7V,V_{IN}-V_{OUT}=1.0V V_{OUT}≦1.7V,V_{IN}-V_{OUT}=1.2V I_{OUT}=10mA		65		dB
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	I_{OUT}=1mA,-40℃≦TJ≦85℃		±100		ppm/℃
V_{ENH}	EN Input Voltage "H"		1.2			V
V_{ENL}	EN Input Voltage "L"				0.6	V
I_{EN}	Enable Pull-high Current	$V_{EN1,2}$=0V		1	2	uA
I_{SD}	Shutdown Current	$I_{OUT1,2}$=0mA, V_{IN}=5V,$V_{EN1,2}$=0V		2	4	uA
eN	Output Noise	BW=10Hz to 100kHz,Co=1uF		100		uVrms
R_{LOW}	On Resistance for Auto-Discharge	V_{EN}=0V		60		Ω

Note 5: Dropout voltage is tested by reducing input voltage until the output drops 2% below its nominal value.

Typical Application Circuit



Application Information

The EC3121 requires input and output decoupling capacitors. The device is specifically designed for portable applications requiring minimum board space and smallest components. These capacitors must be correctly selected for good performance (see Capacitor Characteristics Section). Please note that linear regulators with a low dropout voltage have high internal loop gains which require care in guarding against oscillation caused by insufficient decoupling capacitance.

Input Capacitor

An input capacitance of 1μF is required space between input pin and ground pin directly (the amount of the capacitance may be increased without limit).The input capacitor must be located less than 1cm from the device to assure input stability. A lower ESR capacitor allows the use of less capacitance, while higher ESR type (like aluminum electrolytic)requires more capacitance.Capacitor types (aluminum, ceramic and tantalum) can be mixed in parallel, but the total equivalent input capacitance ESR must be defined as above to stable operation. There are no requirements for the ESR on the input capacitor, but tolerance and temperature coefficient must be considered when selecting the capacitor to ensure the capacitance will be 1μF over the entire operating temperature range.

Output Capacitor

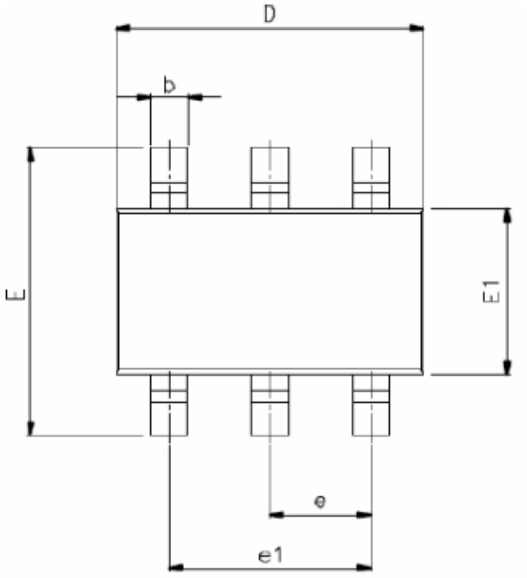
The EC3121 is designed specifically to work with very small ceramic output capacitors. A ceramic capacitor (temperature characteristics X7R, X5R) in 1μF is suitable for the EC3121 application.The recommended minimum capacitance for the device is 1μF(X5R or X7R dielectric ceramic), between V_{OUT} and GND for stability, but it may be increased without limit. Higher capacitance values help to improve transient. The output capacitor's ESR is critical because it forms a zero to provide phase lead which is required for loop stability.

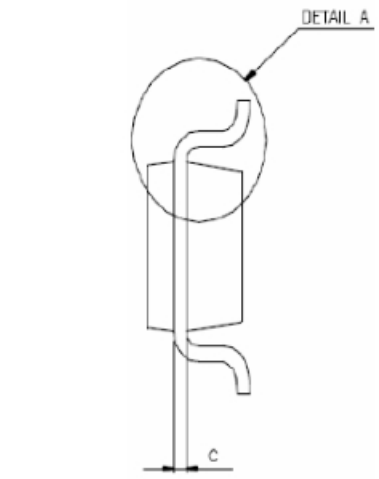
Thermal Considerations

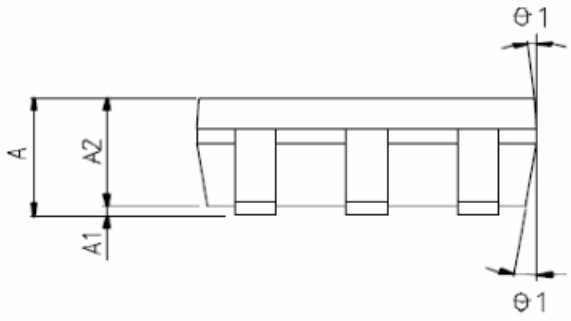
The EC3121 series can provide a current of up to 300mA/channel over the full operating junction temperature range. However, the maximum output current must be debated at higher ambient temperature to ensure the junction temperature does not exceed 125°C. With all possible conditions, the junction temperature must be within the range specified under operating conditions. Power dissipation can be calculated based on the output current and the voltage drop across regulator.

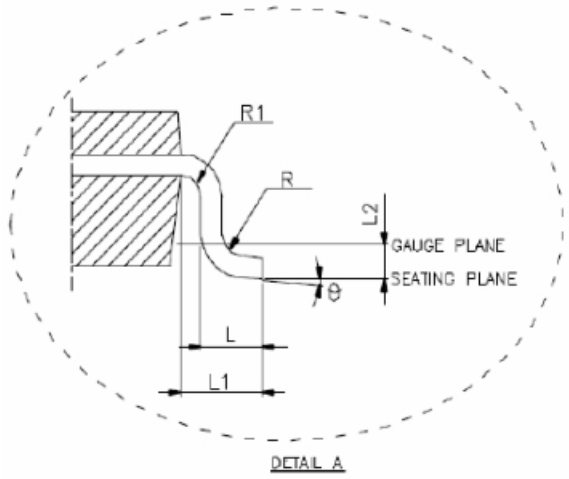
Package Dimension

OUTLINE DRAWING SOT23-6L









VARIATION(ALL DIMENSIONS SHOWN IN MM)

SYMBOL	MIN.	NOM.	MAX.
A	–	–	1.45
A1	–	–	0.15
A2	0.90	1.15	1.30
b	0.30	–	0.50
c	0.08	–	0.22
D		2.90 BSC.	
E		2.80 BSC.	
E1		1.60 BSC.	
e		0.95 BSC	
e1		1.90 BSC.	
L	0.30	0.45	0.60
L1		0.60 REF.	
L2		0.25 BSC.	
R	0.10	–	–
R1	0.10	–	0.25
θ	0°	4°	8°
θ1	5°	10°	15°

NOTE : 1.JEDEC OUTLINE : TO-178 AB