

Product Summary

The GPL6221 series are a group of positive voltage regulators manufactured by CMOS technologies with high ripple rejection, ultra-low noise, low power consumption and low dropout voltage, which can prolong battery life in portable electronics. The GPL6221 series work with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications. The GPL6221 series consume less than 0.1 μ A in shutdown mode and have fast turn-on time less than 50 μ S. The series are very suitable for the battery-powered equipment, such as RF applications and other systems requiring a quiet voltage source.

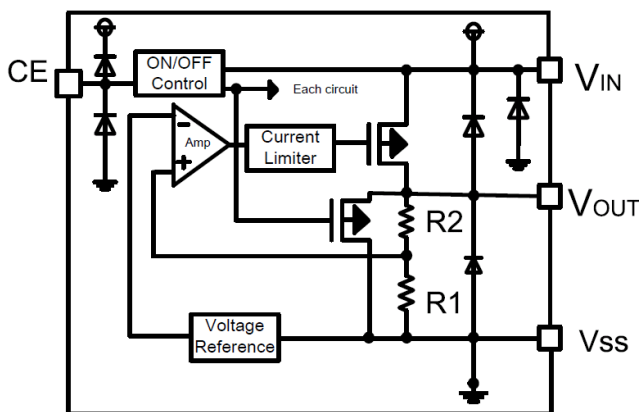
Features

- Low Quiescent Current: 25 μ A
- High Ripple Rejection: 85dB@1kHz
- Operating Voltage Range: 1.8V~6.0V
- Low Dropout Voltage: 50mV@100mA
- Output Voltage: 0.8V~ 5.0V
- High Accuracy: \pm 2%(Typ.)
- TTL-Logic-Controlled Shutdown Input
- Excellent Line and Load Transient Response
- Built-in Current Limiter, Short-Circuit Protection

Applications

- Cellular and Smart Phones
- Radio control systems
- Laptop, Palmtops and PDAs
- Digital Still and Video Cameras
- MP3, MP4 Player
- Battery-Powered Equipment

Block Diagram



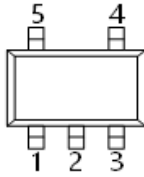
Order Information

GPL6221V①②

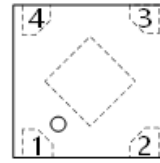
Designator	Description
①	Output Voltage e.g. 1.8V=18
②	Package: SOT-23-5L=K5 DFN1*1-4=H1

Pin Configuration

SOT-23-5L



DFN1*1-4L



Pin Number	Pin Name	Function
SOT-23-5L		
1	V_{IN}	Power Input Pin
2	V_{SS}	Ground
3	CE	Chip Enable Pin
4	NC	No Connection
5	V_{OUT}	Output Pin

WBFBP-04C/DFN1*1-4L

Pin Number	Pin Name	Function
1	V_{OUT}	Output Pin
2	V_{SS}	Ground
3	CE	Chip Enable Pin
4	V_{IN}	Power Input Pin

Absolute Maximum Ratings ($T_a=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Ratings	Units	
Input Voltage ⁽²⁾	V_{IN}	$V_{SS}-0.3\sim V_{SS}+7$	V	
Output Voltage ⁽²⁾	V_{OUT}	$V_{SS}-0.3\sim V_{IN}+0.3$	V	
Output Current	I_{OUT}	500	mA	
Power Dissipation	SOT-23-5L	P_D	0.38	W
	DFN1*1-4	P_D	0.40	W
Thermal Resistance	SOT-23-5L	θ_{JA}	258	$^{\circ}\text{C}/\text{W}$
	DFN1*1-4	θ_{JA}	250	$^{\circ}\text{C}/\text{W}$
Operating Free Air Temperature Range	T_A	-40~85	$^{\circ}\text{C}$	
Operating Junction Temperature Range	T_j	-40~125	$^{\circ}\text{C}$	
Storage Temperature	T_{stg}	-40~125	$^{\circ}\text{C}$	
Lead Temperature(Soldering, 10 sec)	T_{solder}	260	$^{\circ}\text{C}$	
ESD rating ⁽⁴⁾	Human Body Model -(HBM)	2	kV	
	Machine Model- (MM)	200	V	

(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.

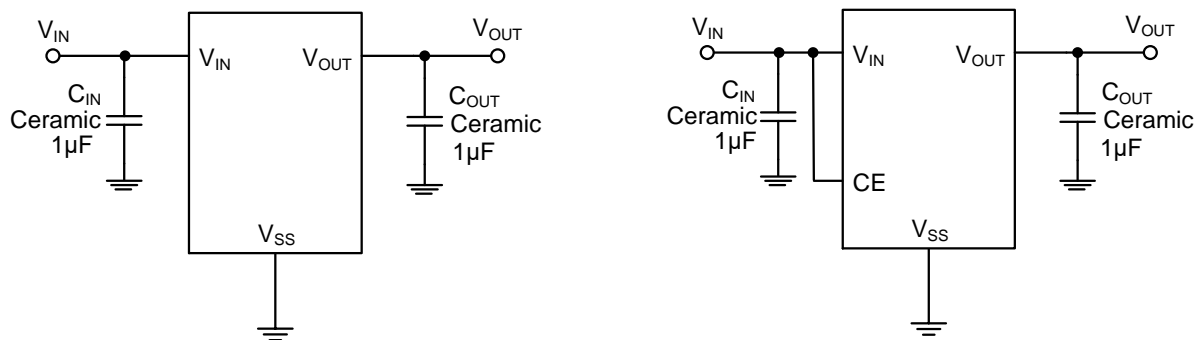
(2) All voltages are with respect to network ground terminal.

Electrical Characteristics ($V_{IN}=V_{OUT}+1V$, $C_{IN}=C_{OUT}=1\mu F$, $T_A=25^\circ C$, unless otherwise specified)

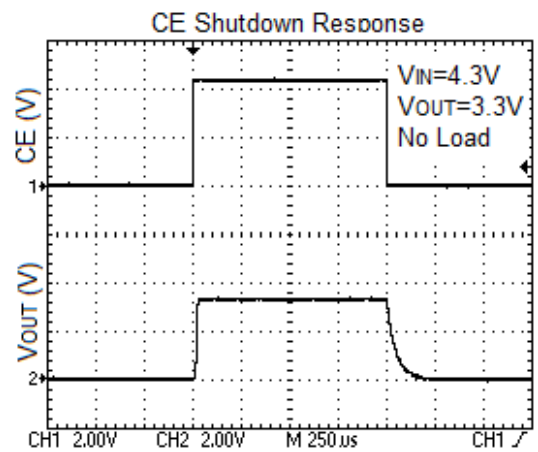
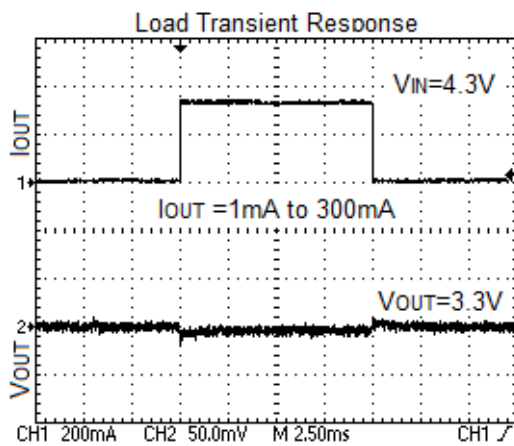
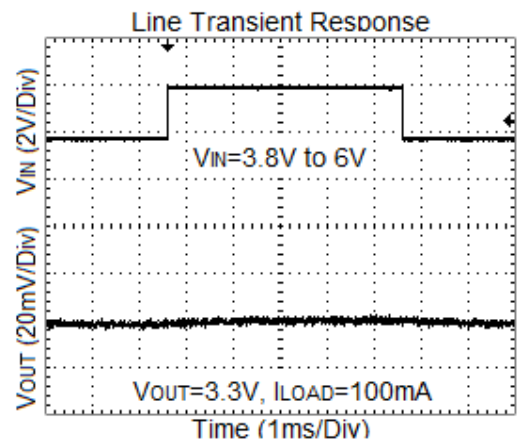
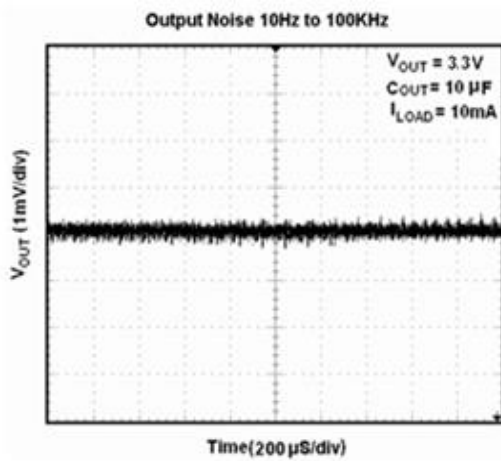
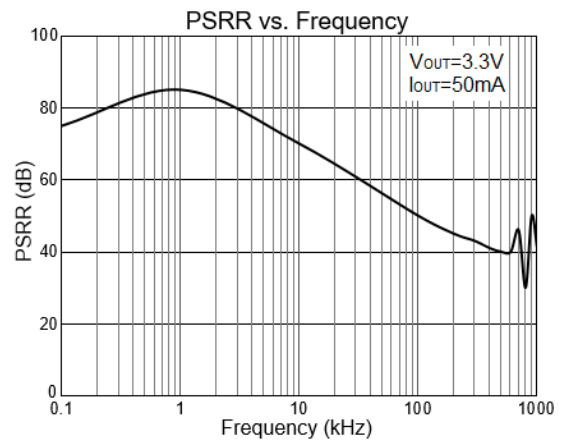
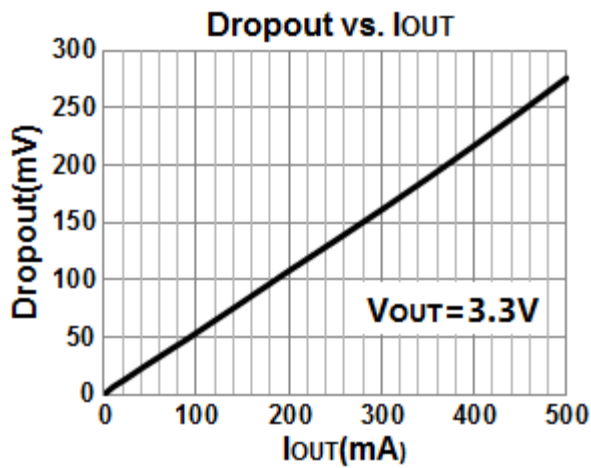
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	$V_{OUT(E)}^{2)}$	$I_{OUT}=1mA$	$V_{OUT}*0.98$	V_{OUT}	$V_{OUT}*1.02$	V
Supply Current	I_{SS}	$I_{OUT}=0$		25	50	μA
Standby Current	I_{STBY}	$CE = V_{SS}$		0.1	1	μA
Output Current	I_{OUT}	$V_{OUT}\geq 1.0V$	500	700		mA
		$V_{OUT}\geq 0.8V$	300	500		
Dropout Voltage ³⁾	V_{dif}	$I_{OUT} = 100mA$ $V_{OUT}\geq 3.3V$		50		mV
Load Regulation	ΔV_{OUT}	$V_{IN} = V_{OUT} + 1V$, $1mA \leq I_{OUT} \leq 100mA$		1		mV
Line Regulation		$I_{OUT} = 10mA$ $V_{OUT} + 1V \leq V_{IN} \leq 6V$		0.01	0.2	%/V
Output Voltage Temperature Characteristics		$I_{OUT} = 10mA$ $-40 \leq T \leq +85$		50		ppm
Short Current	I_{Short}	$V_{OUT} = V_{SS}$		50		mA
Input Voltage	V_{IN}	—	1.8		6.0	V
Power Supply Rejection Rate	100Hz	$I_{OUT}=50mA$	PSRR		75	dB
	1kHz				85	
	10kHz				70	
CE "High" Voltage	$V_{CE"H"}$		1.5		V_{IN}	V
CE "Low" Voltage	$V_{CE"L"}$				0.3	V
C_{OUT} Auto-Discharge Resistance	$R_{DISCHRG}$	$V_{IN}=5V, V_{OUT}=3.0V$, $V_{CE}=V_{SS}$		60		Ω

- 1) V_{OUT} : Specified Output Voltage.
- 2) $V_{OUT(E)}$: Effective Output Voltage (i.e. The output voltage when $V_{IN} = (V_{OUT} + 1.0V)$ and maintain a certain I_{OUT} Value).
- 3) V_{dif} : The Difference Of Output Voltage And Input Voltage When Input Voltage Is Decreased Gradually Till Output Voltage Equals To 98% Of V_{OUT} (E).

Typical Application



Typical Performance Characteristics



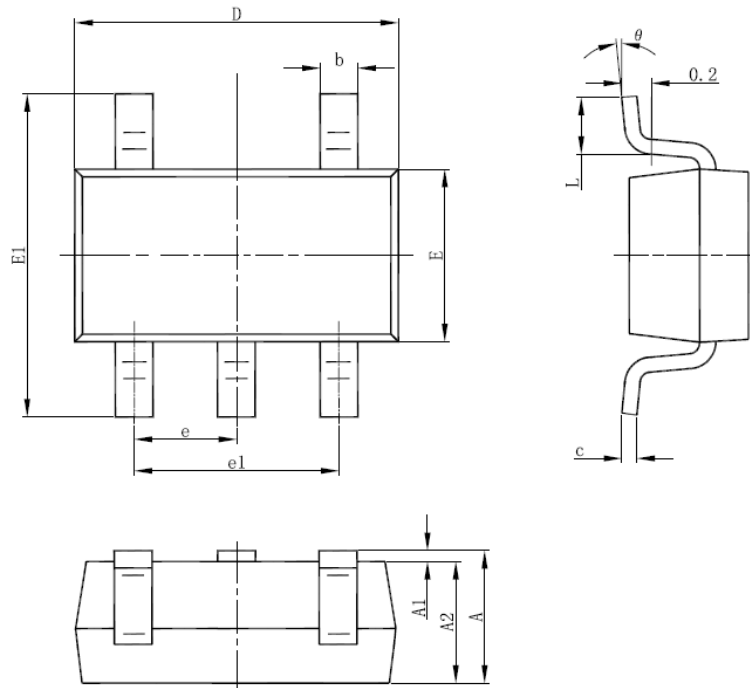
C_{OUT} Auto-Discharge Function

GPL6221 series can discharge the electric charge in the output capacitor (C_{OUT}), when a low signal to the CE pin, which enables a whole IC circuit turn off, is inputted via the N-channel transistor located between the V_{OUT} pin and the V_{SS} pin (cf. BLOCK DIAGRAM). The C_{OUT} auto-discharge resistance value is set at 60Ω (V_{OUT}=3.0V @ V_{IN}=5.0V at typical). The discharge time of the output capacitor (C_{OUT}) is set by the C_{OUT} auto-discharge resistance (R) and the output capacitor (C_{OUT}). By setting time constant of a C_{OUT} auto-discharge resistance value [R_{DISCHRG}] and an output capacitor value (C_{OUT}) as τ (τ=C x R_{DISCHRG}), the output voltage after discharge via the N-channel transistor is calculated by the following formulas.

$$V = V_{OUT(E)} \times e^{-t/\tau}, \text{ or } t = \tau \ln (V / V_{OUT(E)})$$

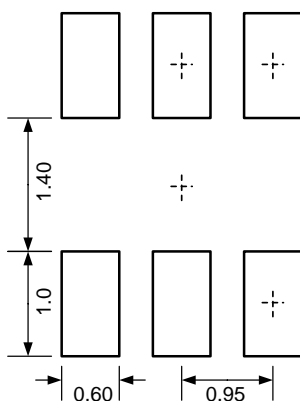
(V: Output voltage after discharge, V_{OUT (E)}: Output voltage, t: Discharge time.τ: C_{OUT} auto-discharge resistance R_{DISCHRG}×Output capacitor (C_{OUT}) value C)

SOT-23-5L Package Outline Dimensions



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
c	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950(BSC)	
e1	1.800	2.000
L	0.300	0.600
θ	0°	8°

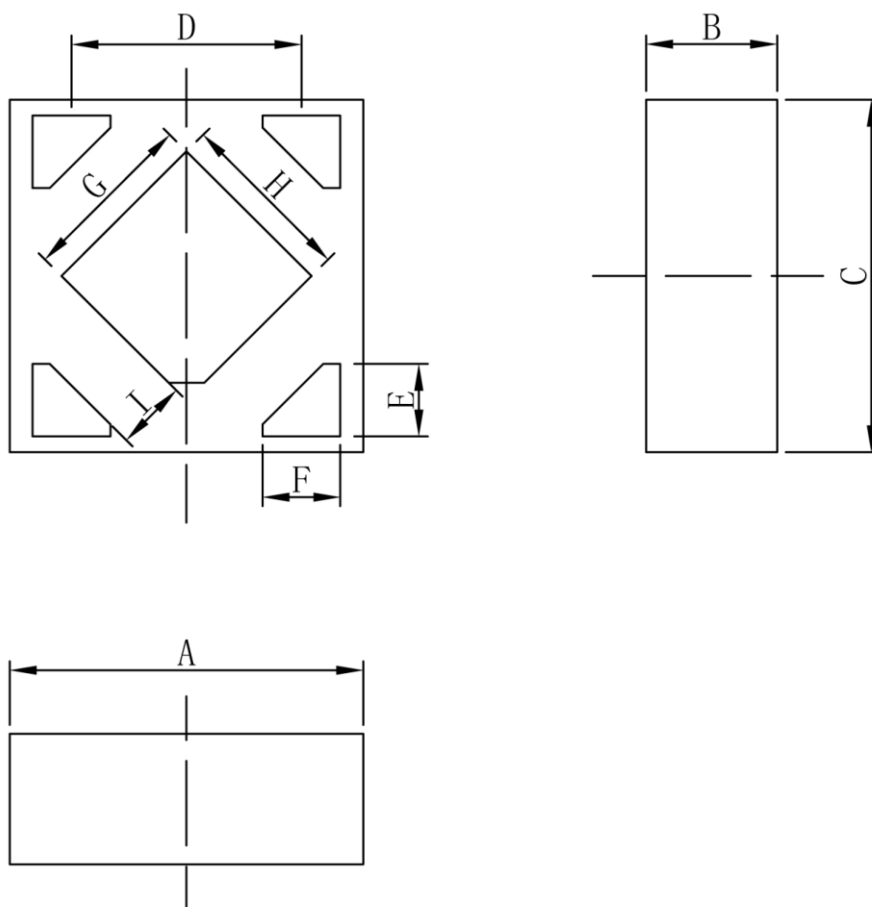
SOT-23-5L Suggested Pad Layout (Unit: mm)



Notes:

1. General tolerance: ± 0.05 mm.
2. The pad layout is for reference purposes only.

DFN1*1-4L Package Outline Dimensions



Symbol	Dimensions in millimeters	
	Min.	Max.
A	0.950	1.050
B	0.320	0.420
C	0.950	1.050
D	0.600	0.700
E	0.175	0.275
F	0.170	0.270
G	0.440	0.540
H	0.440	0.540
I	0.140	0.240