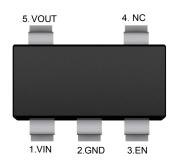


# **PJ9193** Low Dropout Regulators

## Description

The PJ9193 is designed for portable RF and wireless applications with demanding performance and space requirements. The PJ9193 performance is optimized for batterypowered systems to deliver ultra low noise and low quiescent current. Regulator ground current increases only slightly in dropout, further prolonging the battery life. The PJ9193 also works with low-ESR ceramic capacitors, reducing the amount of board space necessary for power applications, critical in handheld wireless devices. The PJ9193 consumes less than 0.01µA in shutdown mode and has fast turn-on time less than 50µs. The other features include ultra low dropout voltage, high output accuracy, current limiting protection, and high ripple rejection ratio.

#### SOT-23-5



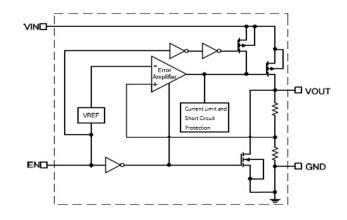
### Features

- Ultra Low Noise for RF Application
- Ultra Fast Response in Line/Load Transient
- Maximum Output Current: 500mA
- Low Dropout : 200mV @ 200mA
- Wide Operating Voltage Ranges : 2V to 7V
- Low Temperature Coefficient
- Current Limiting Protection
- Thermal Shutdown Protection

## Applications

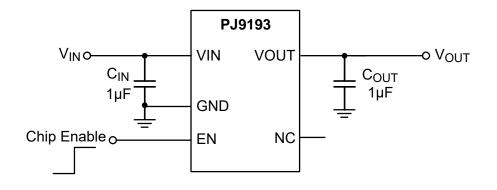
- Battery-Powered Equipment
- CDMA/GSM Cellular Handsets
- Portable Information Appliances

# Function Block Diagram

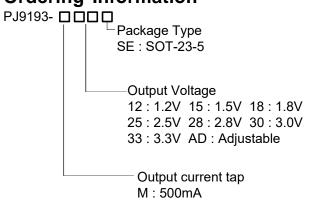




# **Typical Application Circuit**



# **Ordering Information**



# **Functional Pin Description**

Pin Name	Pin Function
EN	Chip Enable (Active High). Note that this pin is high impedance
NC	NO Connected
GND	Ground.
VOUT	Output Voltage.
VIN	Power Input Voltage.



#### Absolute Maximum Ratings Note1

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Value	Unit	
Supply Voltage	-0.3 ~ +6	V	
Output Voltage	-0.3 ~ (VIN+0.3)	V	
Output Current	600	mA	
Power Dissipation	400	mW	
Thermal Resistance, Junction-to-Ambient	250	°C/W	
Thermal Resistance, Junction-to-Case	60	°C/W	
Junction temperature	-40 ~ +125	°C	
Storage temperature range	-55 ~ 150	٦°	

#### Note:

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 my affect device reliability.

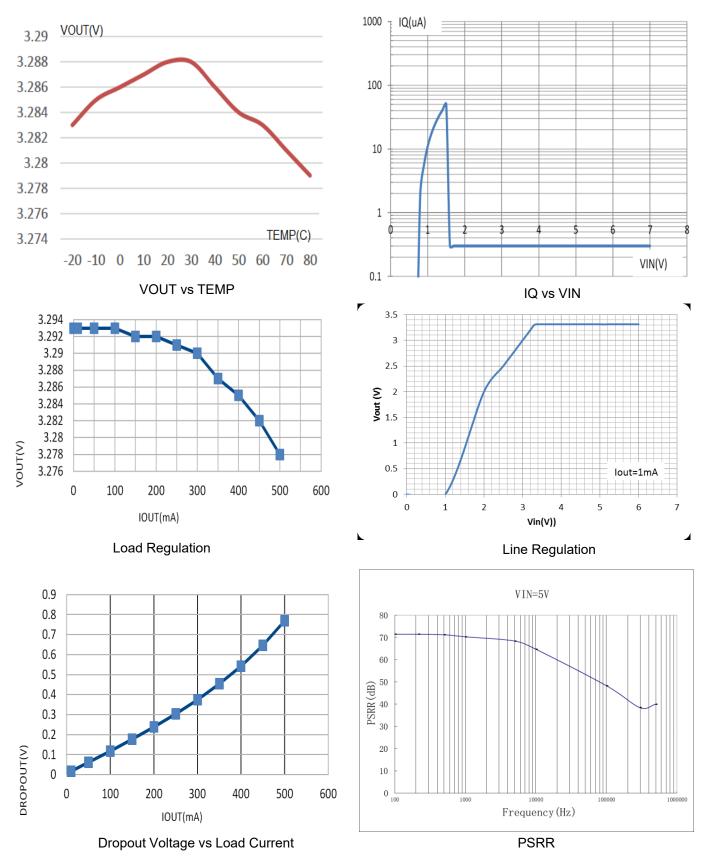


## **Electrical Characteristics**

Pa	rameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Voltage		V <sub>IN</sub>		2		6	V
Output Voltage Accuracy		$\Delta V_{OUT}$	I <sub>OUT</sub> =1mA	-1.5		+1.5	%
Quieso	Quiescent Current		V <sub>IN</sub> >V <sub>OUT</sub> ,EN=V <sub>IN</sub> I <sub>OUT</sub> =0mA		90	130	μA
		V <sub>DROP</sub>	I <sub>OUT</sub> =200mA		130	180	- mV
Dropo	Dropout Voltage		I <sub>OUT</sub> =300mA		210	300	
Line F	Line Regulation		V <sub>IN</sub> =3.6V to 5.5V I <sub>OUT</sub> =1mA			0.17	%/V
Load	Load Regulation		1mA <i<sub>OUT&lt;300mA</i<sub>			2	%
	Output Voltage Temperature Coefficient		I <sub>OUT</sub> =30mA, T <sub>A</sub> =0~70℃		±100		ppm/°C
Short circuit/start carrying current		I <sub>SHORT</sub>	RL=1Ω		90		mA
EN Lea	EN Leakage Current					0.1	μA
Standb	Standby Current		V <sub>EN</sub> =GND,Shutdown		0.01	1	μA
Cur	Current Limit		VIN=5V		550		mA
EN Input	Logic Low	V <sub>IL</sub>	V <sub>IN</sub> =3V to 5.5V, Shutdown			0.4	V
Threshold	Logic High	V <sub>IH</sub>	V <sub>IN</sub> =3V to 5.5V, Start up	1.2			V
Output Noise Voltage		e <sub>NO</sub>	10Hz to100KHz, C <sub>OUT</sub> =1uF		100		$\mu V_{RMS}$
Power	f=217Hz	PSRR	lout=100mA		-72		
Supply Rejection Ratio	f=1KHz				-70		dB
	f=10KHz				-65		
Tem	Thermal Shutdown Temperature		Shutdown, Temp increasing		160		°C
	Thermal Shutdown Hysteresis				20		°C



### **Typical Characteristic Curves**





## **Applications Information**

Like any low dropout regulator, the external capacitors used with the PJ9193 must be carefully selected for regulator stability and performance. Using a capacitor whose value is  $>1\mu$ F on the PJ9193 input and the amount of capacitance can be increased without limit. The input capacitor must be located a distance of not more than 0.5 inch from the input pin of the IC and returned to a clean analog ground. Any good quality ceramic or tantalum can be used for this capacitor. The capacitor with larger value and lower ESR (equivalent series resistance) provides better PSRR and linetransient response. The output capacitor must meet both requirements for minimum amount of capacitance and ESR in all LDOs application. The PJ9193 is designed specifically to work with low ESR ceramic output capacitor in space-saving and performance consideration. Using a ceramic capacitor whose value is at least 1µF with ESR is >1m $\Omega$  on the PJ9193 output ensures stability. The PJ9193 still works well with output capacitor of other types due to the wide stable ESR range. Figure 1 shows the curves of allowable ESR range as a function of load current for various output capacitor values. Output capacitor of larger capacitance can reduce noise and improve load transient response, stability, and PSRR. The output capacitor should be located not more than 0.5 inch from the V<sub>OUT</sub> pin of the PJ9193 and returned to a clean analog ground.

#### 100 Instable 10 COUT ESR(Ω) 1 Stable 0.1 0.01 PJ9193-15xU5 $C_{IN} = C_{OUT} = 1\mu F, X7R$ 0.001 0 50 100 150 200 250 300 Load Current (mA)

#### Figure 1Region of Stable COUT ESR vs. Load Current

#### **Enable Function**

The PJ9193 features an LDO regulator enable/disable function. To assure the LDO regulator will switch on, the EN turn on control level must be greater than 1.2 volts. The LDO regulator will go into the shutdown mode when the voltage on the EN pin falls below 0.4 volts. For to protecting the system, the PJ9193 have a quick-discharge function. If the enable function is not needed in a specific application, it may be tied to  $V_{IN}$  to keep the LDO regulator in a continuously on state.

#### **Thermal Considerations**

Thermal protection limits power dissipation in PJ9193. When the operation junction temperature exceeds 165°C, the OTP circuit starts the thermal shutdown function turn the pass element off. The pass element turn on again after the junction temperature cools by 30°C.

For continue operation, do not exceed absolute maximum operation junction temperature 125°C. The power dissipation definition in device is :

$$\mathsf{P}_{\mathsf{D}} = (\mathsf{V}_{\mathsf{IN}} - \mathsf{V}_{\mathsf{OUT}}) \times \mathsf{I}_{\mathsf{OUT}} + \mathsf{V}_{\mathsf{IN}} \times \mathsf{I}_{\mathsf{Q}}$$

The maximum power dissipation depends on the thermal resistance of IC package, PCB layout, the rate of surroundings airflow and temperature difference between junction to ambient. The maximum power dissipation can be calculated by following formula :

#### $P_{D(MAX)} = (T_{J(MAX)} - T_A) / R_{\theta JA}$

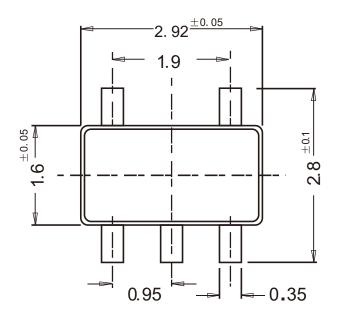
Where  $T_{J(MAX)}$  is the maximum operation junction temperature 125°C,  $T_A$  is the ambient temperature and the  $R_{\theta JA}$  is the junction to ambient thermal resistance.

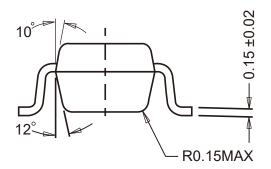
For recommended operating conditions specification of PJ9193, where  $T_{J(MAX)}$  is the maximum junction temperature of the die (125°C) and  $T_A$  is the maximum ambient temperature. The junction to ambient thermal resistance ( $R_{\theta JA}$  is layout dependent) for SOT-23-5 package is 250°C/W, The maximum power dissipation at  $T_A$  = 25°C can be calculated by following formula :

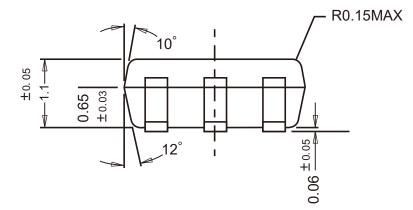
 $P_{D(MAX)} = (125^{\circ}C - 25^{\circ}C) / 250 = 400 \text{mW}$ 



**Package Outline** SOT-23-5 Dimensions in mm







## **Ordering Information**

Device	Package	Shipping
PJ9193	SOT-23-5	3,000/ Tape & Reel (7 inches)

# **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for pingjingsemi manufacturer:

Other Similar products are found below :

PJ78L15SQ PJ78L12SQ PJ1117SQ-3.3 PJM2305PSA MMBT9013H PJM90H09NTF PJ78M09TE PJ71K33SQ LMV321 PJM2301PSA-S PJ71K50SQ PJ75AL30SQ 2SB1132SQ-Q PJ75AL36SQ PJ79L05SQ MMBT3904 2SD965ASQ-R PJ71K30SQ PJ73AL30SQ PJ73AL36SQ 2SB772SQ-P PJ73AL33SQ PJ7805TC PJ78L08SQ MMBT8050D(1.5A) PJ9193M33SE BCX53SQ-16 MMBTA94 PJ71K50SC PJM84PSA PJ78M05TE 2SB1188SQ-Q PJM3415PSA PJ75AL50SQ MMBT2907A MMBTA44 TL431SQ PJ71K33SC MMBTSC1623-L6 PJ71K30SC PJM2302NSA-S MMBT9015C MMBT8550D(1.5A) MMBTSC1623-L7 PJ73AL50SQ PJM2302NSA PJM2301PSA MMBTSC945H MMBTSC3875Y SS14F-PJ