TX6213 series
300mA Low Power LDO

Features

- Input voltage:2.5V~6.5V
- Output range:1.0V~3.6V (customized by every 0.1V step)
- Maximum output current: 300mA @ VIN-VOUT=0.5V
- PSRR: 75dB @1KHz
- Dropout voltage:220mV @ IOUT=200mA
- Quiescent current: 50μA Typ.
- Shut-down current: <1μA
- Recommend capacitor:1μF
- Ultra Low Output Noise:20μVRMS

Applications

- MP3/MP4 Players
- Cellphones, radiophone, digital cameras
- Bluetooth, wireless handsets
- Others portable electronics device

General Description

The TX6213 is a high accuracy, low noise, high speed, low dropout CMOS Linear regulator with high ripple rejection and fast discharge function. The devices offer a new level of cost effective performance in cellular phones, laptop and notebook computers, and other portable devices.

TX6213 can provide product selections of output value in the range of 1.0V~3.6V by every 0.1V step.

The current limiter's fold-back circuit also operates as a short circuit protection and an output current limiter at the output pin.

The TX6213 regulators are available in standard SOT23-5L and DFN1×1-4 packages. Standard products are Pb-free and Halogen-free.

Selection Table

Part No.	Package	Temperature	Tape & Reel
TX6213-XXM5G	SOT23-5L	-40 ~ +85℃	3000/REEL
TX6213-XXFCG	DFN1×1—4	-40 ~ +85℃	10000/REEL

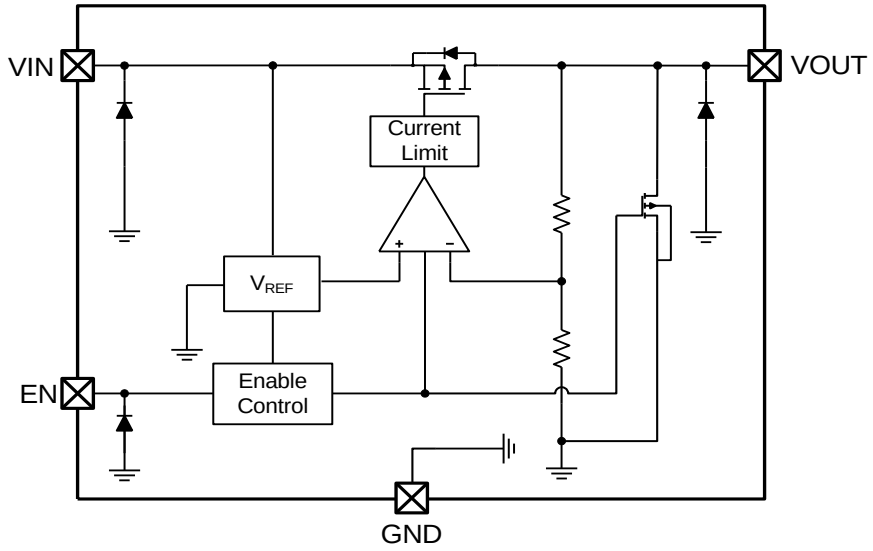
Note: XX indicates 1.0V~3.3V by 0.1V step. For example, 28 means product outputs 2.8V

Order Information

TX6213-①②

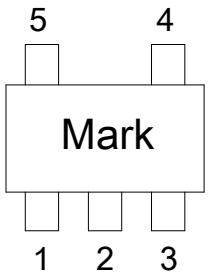
Designator	Description
①	Voltage version: XX: 1.0V~3.6V by 0.1V step Example: 28: 2.8V
②	Package: M5G: SOT23-5L FCG:DFN1×1—4

Block Diagram



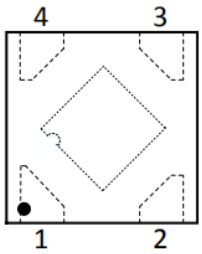
Pin Assignment

SOT23-5 (Top View)



PIN NO SOT23-5L	SYMBOL	I/O	DESCRIPTTION
1	VIN	Power	Input
2	GND	Ground	Ground
3	EN	I	Enable(Active high, not floating)
4	NC	/	Not connected
5	VOUT	O	Output

DFN1x1-4L（Top View）



PIN NO DFN1×1—4	SYMBOL	I/O	DESCRIPTTION
1	VOUT	O	Output
2	GND	Ground	Ground
3	CE	I	Enable(Active high, not floating)
4	VIN	Power	Input

Absolute Maximum Ratings

Input Voltage……..-0.3V to 8V
Output Current……300mA
Operating Temperature .....-40℃ to 85℃
Ambient Temperature……..……-40℃ to 85℃
Storage Temperature .....-55℃ to 150℃
Package Lead Soldering Temperature.....260℃
Junction Temperature…… -40℃ to 125℃

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Thermal Information

Symbol	Parameter	Package	Max.	Unit
θ_{JA}	Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink)	SOT23-5	500	℃/W
		DFN1×1—4	250	
P_D	Power Dissipation	SOT23-5	0.30	W
		DFN1×1—4	0.60	

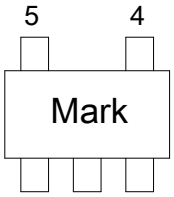
Note: P_D is measured at Ta= 25℃

Electrical Characteristics

The following specifications apply for V_{OUT}=2.8V,T_A=25℃, unless specified otherwise

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage				6.5	V
V_{OUT}	Output Range	V_{OUT} <2V V_{IN}=2.7V, I_{OUT}=1mA	-3	V_{OUT}	3	%
		V_{OUT} ≥2V, I_{OUT}=1mA	-2	V_{OUT}	2	
I_Q	Quiescent Current	V_{OUT}=2.8V, I_{OUT}=0		50		μA
I_{LIMIT}	Current Limit	V_{IN}=V_{EN}=4.5V		300		mA
V_{DROP}	Dropout Voltage	V_{OUT}=2.8V, I_{OUT}=200mA		220	250	mV
		V_{OUT}=2.8V, I_{OUT}=300mA		320	350	
△V_{LINE}	Line Regulation	V_{IN}=2.7~5.5V, I_{OUT}=1mA		0.01	0.15	%/V
△V_{LOAD}	Load Regulation	V_{OUT}=2.8V, I_{OUT}=1~300mA		40	70	mV
I_{SHORT}	Short Current	V_{EN}=V_{IN}, V_{OUT} Short to GND with 1Ω		80		mA
I_{SHDN}	Shut-down Current	V_{EN}=0V			1	μA
PSRR	Power Supply Rejection Rate	V_{IN}=5V_{DC}+0.5V_{P-P} F=1KHz, I_{OUT}=10mA		75		dB
		V_{IN}=5V_{DC}+0.5V_{P-P} F=1MHz, I_{OUT}=10mA		55		
V_{ENH}	EN logic high voltage	V_{IN}=5.5V, I_{OUT}=1mA	1.2		V_{IN}	V
V_{ENL}	EN logic low voltage	V_{IN}=5.5V, V_{OUT}=0V			0.4	V
I_{EN}	EN Input Current	V_{EN}= 0 to 5.5V			1	μA
e_{NO}	Output Noise Voltage	10Hz to 100KHz, C_{OUT}=1μF		20		μV_{RMS}

Marking Description



MARKING	
VOLTAGE(V)	Package
	SOT23-5、SOT23-3、SOT23
1.2	LVBX
1.5	LVEX
1.8	LVKX
2.5	LVTX
2.8	LVXX
3.0	LVZX
3.3	LV2X

① Represents product series

Mark	Product Series
L	TX6213

② Represents type of regulator

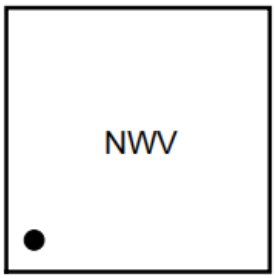
Vout:0.1~3.3V	Vout:3.4~6.0V
V	A

③ Represents output Voltage

Mark	Output Voltage(V)		Mark	Output Voltage(V)	
0	-	3.1	F	1.6	4.6
1	-	3.2	H	1.7	4.7
2	-	3.3	K	1.8	4.8
3	-	3.4	L	1.9	4.9
4	-	3.5	M	2.0	5.0
5	-	3.6	N	2.1	-
6	-	3.7	P	2.2	-
7	-	3.8	R	2.3	-
8	0.9	3.9	S	2.4	-
9	1.0	4.0	T	2.5	-
A	1.1	4.1	U	2.6	-
B	1.2	4.2	V	2.7	-
C	1.3	4.3	X	2.8	-
D	1.4	4.4	Y	2.9	-
E	1.5	4.5	Z	3.0	-

④ Respresents production lot number

0 to 9, A to Z reverse character of 0 to 9, A to Z repeated (G, I, O, Q, W excepted)



DFN1x1-4L

“N”: Product code, here use “L” stand for “TX6213”.

“W”: The week of manufacturing. “A” stands for week 1, “Z” stands for week 26, “a” stands for week 27, “z” stands for week 52.

“V”: Output voltage code.

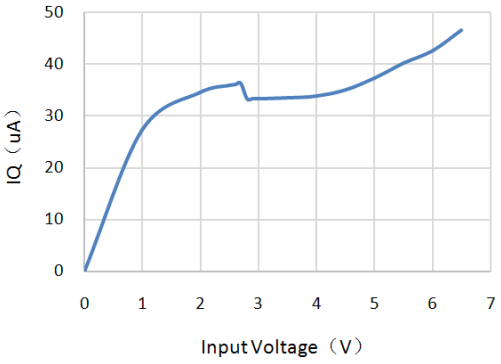
Output voltage（V）	code
1.0	A
1.2	B
1.5	C
1.8	D
2.5	E
2.6	F
2.8	M
3.0	G
3.3	H
3.6	I

Typical Performance Characteristics

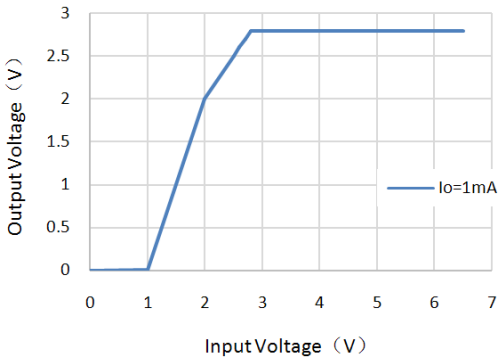
C_{IN}=1uF, C_{OUT}=1uF, V_{IN}=4.5V, V_{OUT}=2.8VT_A=25ºC, unless specified otherwise.

（Package:SOT23-5L）

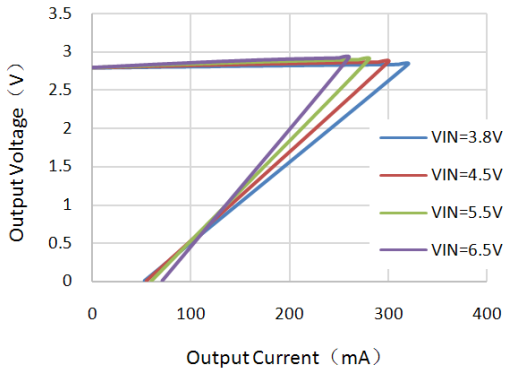
IQ vs. Input Voltage



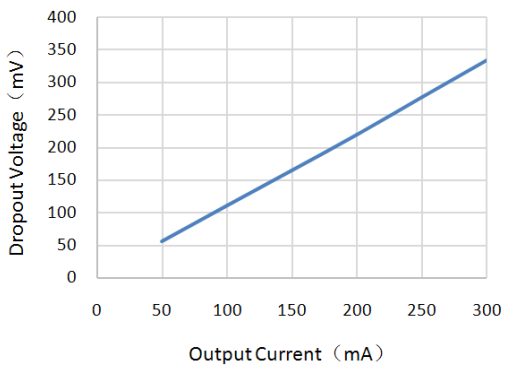
Output Voltage vs. Input Voltage



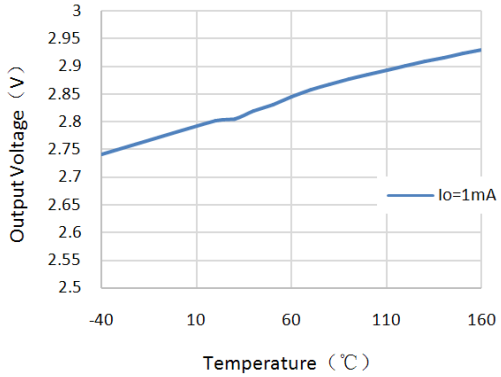
Output Voltage vs. Output Current



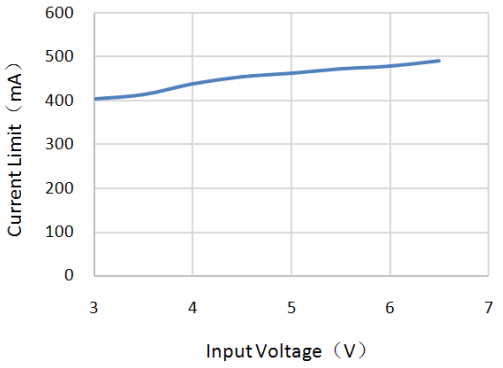
Dropout Voltage vs. Output Current

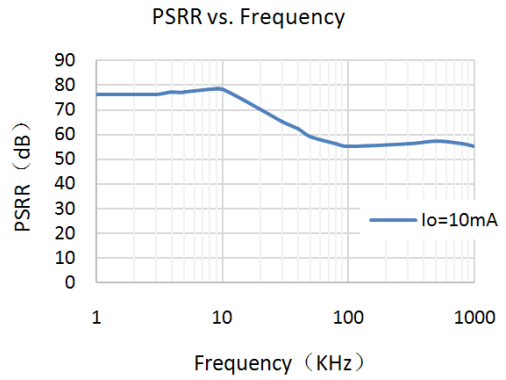


Output Voltage vs. Temperature



Current Limit vs. Input Voltage





EN ON / OFF

V_{EN}=0V to 4.5V I_{OUT}=10mA

V_{EN}=4.5V to 0V I_{OUT}=10mA

Power ON / OFF

V_{IN}=0V to 4.5V I_{OUT}=10mA

V_{IN}=4.5V to 0V I_{OUT}=10mA

Line Transient

V_{IN}=4V to 5VI_{OUT}=10mA

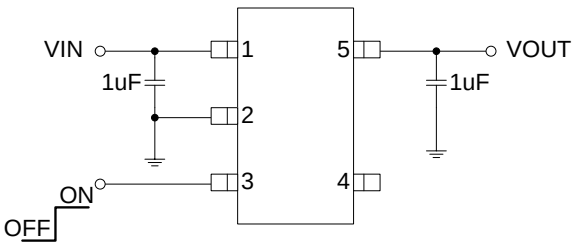
V_{IN}=5V to 4VI_{OUT}=10mA

Load Transient

I_{OUT}=1mA to 300mA

I_{OUT}=300mA to 1mA

Application Circuits



Application Information

INPUT CAPACITOR

An input capacitor of ≥ 1.0μF is required between the VIN and GND pin. This capacitor must be located within 1cm distance from VIN pin and connected to a clear ground. A ceramic capacitor is recommended although a good quality tantalum or film may be used at the input. However, a tantalum capacitor can suffer catastrophic failures due to surge current when connected to a low impedance power supply (such as a battery or a very large capacitor).

There is no requirement for the ESR on the input capacitor, but the tolerance and temperature coefficient must be considered in order to ensure the capacitor work within the operation range over the full range of temperature and operating conditions.

OUTPUT CAPACITOR

In applications, it is important to select the output capacitor to keep in stable operation. The output capacitor must meet all the requirements specified in the following recommended capacitor table over all conditions in applications. The minimum capacitance for stability and correct operation is 0.6μF. The capacitance tolerance should be ±30% or better over the operation temperature range. The recommended capacitor type isX7R to meet the full device temperature specification.

The capacitor application conditions also include DC-bias, frequency and temperature. Unstable operation will result if the capacitance drops below minimum specified value (see the next section Capacitor Characteristics).

The TX6213 is designed to work with very small ceramic output capacitors. A 1.0μF capacitor (X7R type) with ESR type between 0 and 400mΩ is suitable in the applications. X5R capacitors may be used but have a narrow temperature range. With these and other capacitor types (Y5V, Z6U) that may be used, selection relies on the range of operating conditions and temperature range for a specified application. It may also be possible to use tantalum or film capacitors at the output, but these are not as good for reasons of size and cost. It is also recommended that the output capacitor be located within 1cm from the output pin and return to a clean ground wire.

NO-LOAD STABILITY

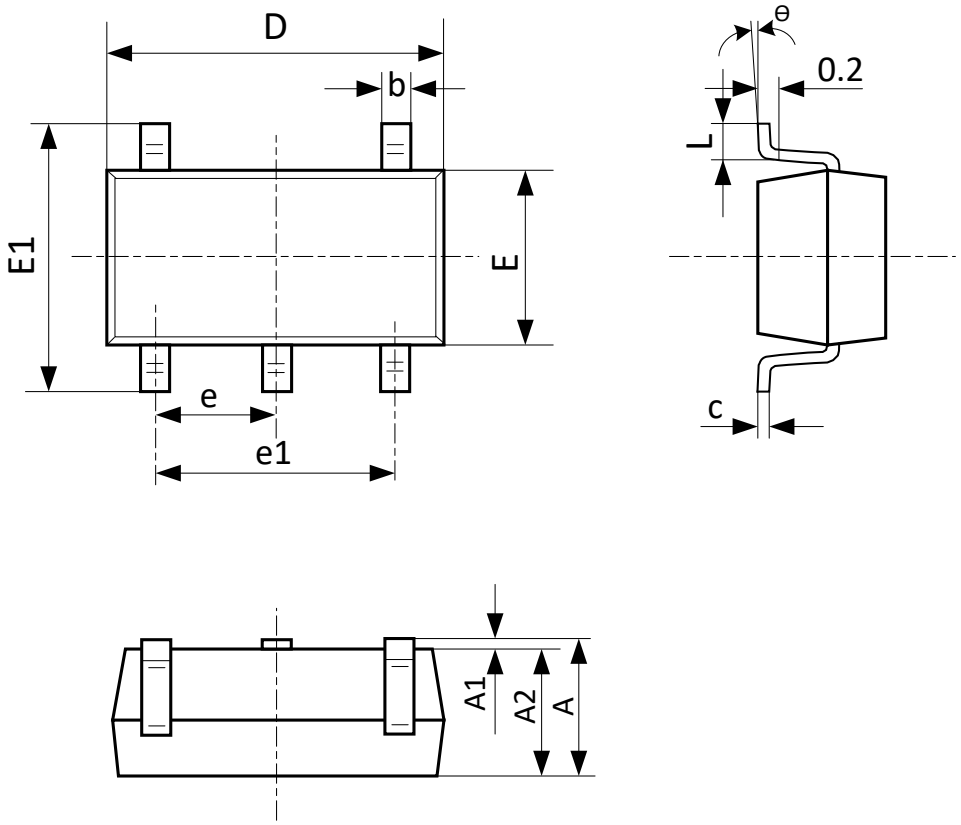
The TX6213 will remain stable and in regulation with no external load. This is especially important in CMOSRAM keep-alive applications.

ON/OFF INPUT OPERATION

The TX6213 is turned off by pulling the EN pin low, and turned on by pulling it high. If this function is not used, the VEN pin should be tied to VIN to keep the regulator output on at all time. To assure proper operation, the signal source used to drive the VEN input must be able to swing above and below the specified turn-on/off voltage thresholds listed in the Electrical Characteristics section under VIL and VIH.

Package Information

SOT23-5 Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0℃	8℃	0℃	8℃

DFN1×1-4 Outline Dimensions