TX6219 Series
High Speed Low Noise LDO

Features

- Low power consumption:25uA (Typ.)
- Low voltage drop:0.25V@100mA(Typ.)
- Low output noise(27uVRMS)
- Standby Mode: 0.1uA
- Low temperature coefficient
- Output Voltage Range: 0.9V~5V
- Good line Regulation:0.05%/V
- High Ripple Rejection: 65dB@1kHz(Typ.)
- High input voltage (up to 10V)
- Output voltage accuracy: tolerance ±2%
- Build-in Enable/Output Current Limit circuit
- SOT23, SOT23-5 and SOT89-5 package

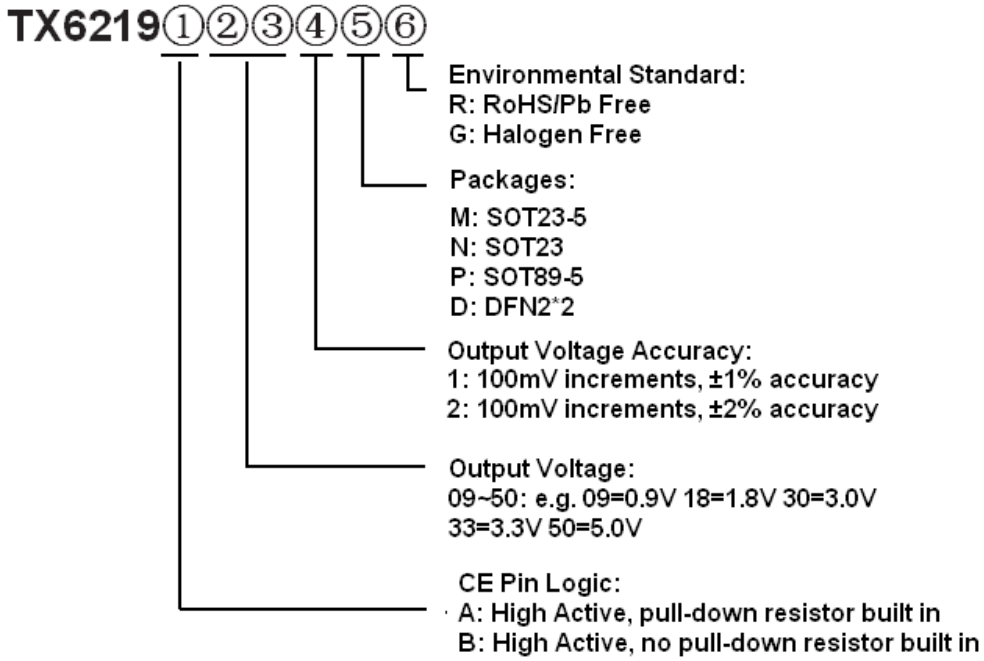
Applications

- Battery-powered equipment
- Communication equipment
- Mobile phones
- Portable games
- Cameras, Video cameras
- Reference voltage sources

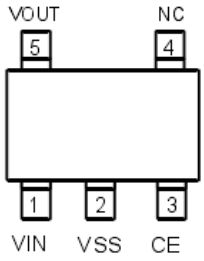
General Description

The TX6219 series are highly accurate, low noise, CMOS LDO Voltage Regulators. Offering low output noise, high ripple rejection ratio, low dropout and very fast turn-on times, the TX6219 series is ideal for today's cutting edge mobile phone. Internally the TX6219 includes a reference voltage source, error amplifiers, driver transistors, current limiters and phase compensators. The TX6219's current limiters' feedback circuit also operates as a short protect for the output current limiter and. the output pin. The output voltage is set by current trimming. Voltages are selectable in 100mV steps within a range of 0.9V to 5.0V. The TX6219 series is also fully compatible with low ESR ceramic capacitors, reducing cost and improving output stability. This high level of 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 frequencies. The CE function allows the output of regulator to be turned off, resulting in greatly reduced power consumption.

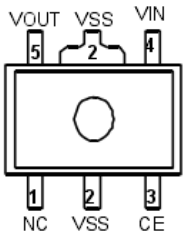
Order Information



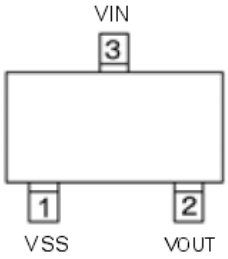
Package and Pin assignment



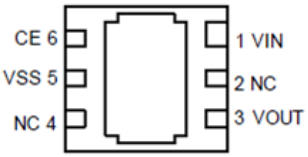
SOT-25 (SOT-23-5)
(TOP VIEW)



SOT-89-5
(TOP VIEW)

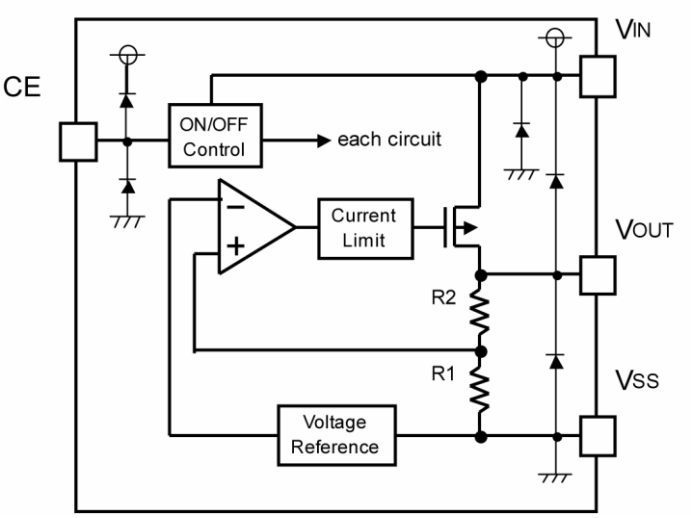


SOT-23
(TOP VIEW)

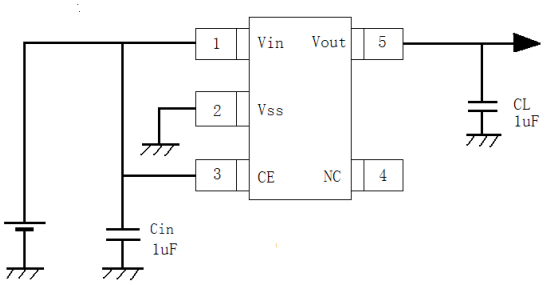


DFN2*2
(BOTTOM VIEW)

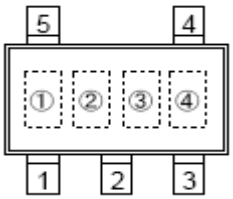
Block Diagram



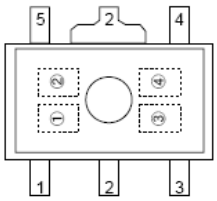
Typical Application Circuit



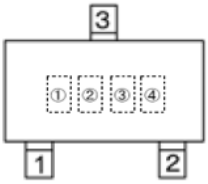
Marking Rule



SOT-25
(TOP VIEW)



SOT-89-5
(TOP VIEW)



SOT-23
(TOP VIEW)

① Represents product series

Mark	Product Series
L	TX6219xxxxxx

② Represents type of regulator

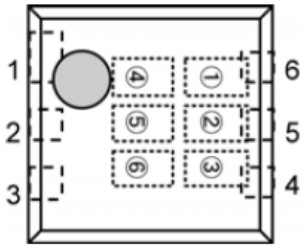
Mark				Product series
Vout 100mV Increments		Vout 50mV Increments		
Vout:0.1~3.0V	Vout:3.1~6.0V	Vout:0.15~3.05V	Vout:3.15~6.05	
V	A	E	L	TX6219Axxxxx

③ Represents output Voltage

Mark	Output Voltage(V)				Mark	Output Voltage(V)			
0	-	3.1	-	3.15	F	1.6	4.6	1.65	4.65
1	-	3.2	-	3.25	H	1.7	4.7	1.75	4.75
2	-	3.3	-	3.35	K	1.8	4.8	1.85	4.85
3	-	3.4	-	3.45	L	1.9	4.9	1.95	4.95
4	-	3.5	-	3.55	M	2.0	5.0	2.05	-
5	-	3.6	-	3.65	N	2.1	-	2.15	-
6	-	3.7	-	3.75	P	2.2	-	2.25	-
7	-	3.8	-	3.85	R	2.3	-	2.35	--
8	0.9	3.9	0.95	3.95	S	2.4	-	2.45	-
9	1.0	4.0	1.05	4.05	T	2.5	-	2.55	-
A	1.1	4.1	1.15	4.15	U	2.6	-	2.65	-
B	1.2	4.2	1.25	4.25	V	2.7	-	2.75	-
C	1.3	4.3	1.35	4.35	X	2.8	-	2.85	-
D	1.4	4.4	1.45	4.45	Y	2.9	-	2.95	-
E	1.5	4.5	1.55	4.55	Z	3.0	-	3.05	-

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)



DFN2*2
(TOP VIEW)

①②Represents product series

Mark	Product Series
19	TX6219xxxxxx

③Represents product series

Mark	Product Series
A	TX6219Axxxxx
B	TX6219Bxxxxx

④Represents type of regulator

Mark				Product series
Vout 100mV Increments		Vout 50mV Increments		
Vout:0.1~3.0V	Vout:3.1~6.0V	Vout:0.15~3.05V	Vout:3.15~6.05	
V	A	E	L	TX6219Axxxxx

⑤Represents output Voltage

Mark	Output Voltage(V)				Mark	Output Voltage(V)			
0	-	3.1	-	3.15	F	1.6	4.6	1.65	4.65
1	-	3.2	-	3.25	H	1.7	4.7	1.75	4.75
2	-	3.3	-	3.35	K	1.8	4.8	1.85	4.85
3	-	3.4	-	3.45	L	1.9	4.9	1.95	4.95
4	-	3.5	-	3.55	M	2.0	5.0	2.05	-
5	-	3.6	-	3.65	N	2.1	-	2.15	-
6	-	3.7	-	3.75	P	2.2	-	2.25	-
7	-	3.8	-	3.85	R	2.3	-	2.35	--
8	0.9	3.9	0.95	3.95	S	2.4	-	2.45	-
9	1.0	4.0	1.05	4.05	T	2.5	-	2.55	-
A	1.1	4.1	1.15	4.15	U	2.6	-	2.65	-
B	1.2	4.2	1.25	4.25	V	2.7	-	2.75	-
C	1.3	4.3	1.35	4.35	X	2.8	-	2.85	-
D	1.4	4.4	1.45	4.45	Y	2.9	-	2.95	-
E	1.5	4.5	1.55	4.55	Z	3.0	-	3.05	-

⑥Represents 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)

Absolute Maximum Ratings

Supply Voltage .....-0.3V to10V Storage Temperature .....-50℃ to 125℃

Operating Temperature .....-40℃ to 85℃

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)	SOT23-3	500	℃/W
		SOT23-5	500	℃/W
		SOT89-5	200	℃/W
		DFN2*2	85	℃/W
P_D	Power Dissipation	SOT23-3	0.20	W
		SOT23-5	0.20	W
		SOT89-5	0.50	W
		DFN2*2	0.10	W

Note: P_D is measured at Ta= 25℃

Electrical Characteristics

TX6219 for any output voltage （Ta=25℃）

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	Vout	Vin=Vout+1V 1.0mA≤Iout≤30mA	Vout×0.98	--	Vout×1.02	V
Output Current*1	Iout	Vin-Vout=1V	--	150	350	mA
Low dropout*2	V_{drop}	Refer to the next table				
Line Regulation	△Vout1/(Vin·Vout)	1.6V≤Vin≤8V Iout=40mA	--	0.05	0.2	%/V
Load Regulation	△Vout /ΔIout	Vin= Vout+1V 1.0mA≤Iout≤80mA	--	12	30	mV
Output voltage Temperature Coefficiency	△Vout/(Ta·Vout)	Iout=30mA 0℃≤Ta≤70℃	--	±100	--	Ppm/℃
Supply Current	Iss1	--	--	25	40	uA
Input Voltage	Vin	--	--	--	9	V
PSRR	PSRR	F=1KHz Vin=Vout+1V	--	65	--	dB
Output Noise	EN	BW=10Hz～100KHz	--	27	--	uVrms

Electrical Characteristics by Output Voltage：

Output Voltage Vout(V)	Dropout Voltage Vdif（V）		
	Conditions	Typ.	Max.
Vout≤1.5V	Iout=100 mA	0.40	0.75
Vout=1.6V		0.38	0.68
Vout=1.7V		0.36	0.63
1.8 ≤ Vout ≤ 2		0.35	0.60
2.1 ≤ Vout ≤ 2.7		0.30	0.52
2.8 ≤ Vout ≤ 5.0		0.25	0.40

Operational Explanation

<Output Voltage Control>

The voltage divided by resistors R1 & R2 is compared with the internal reference voltage by the error amplifier. The P-channel MOSFET, which is connected to the VOUT pin, is then driven by the subsequent output signal. The output voltage at the VOUT pin is controlled and stabilized by a system of negative feedback. The current limit circuit and short protect circuit operate in relation to the level of output current. Further, the IC's internal circuitry can be shutdown via the CE pin's signal

<Low ESR Capacitors>

With the TX6219 series, a stable output voltage is achievable even if used with low ESR capacitors as a phase compensation circuit is built-in. In order to ensure the effectiveness of the phase compensation, we suggest that an output capacitor (CL) is connected as close as possible to the output pin (VOUT) and the VSS pin. Please use an output capacitor with a capacitance value of at least 1 μ F. Also, please connect an input capacitor (CIN) of 0.1 μ F between the VIN pin and the VSS pin in order to ensure a stable power input. Stable phase compensation may not be ensured if the capacitor runs out capacitance when depending on bias and temperature. In case the capacitor depends on the bias and temperature, please make sure the capacitor can ensure the actual capacitance.

<Current Limiter, Short-Circuit Protection>

The TX6219 series includes a combination of a fixed current limiter circuit & a feedback circuit, which aid the operations of the current limiter and circuit protection. When the load current reaches the current limit level, the fixed current limiter circuit operates and output voltage drops. As a result of this drop in output voltage, the feedback circuit operates, output voltage drops further and output current decreases. When the output pin is shorted, a current of about 50mA flows.

<CE Pin>

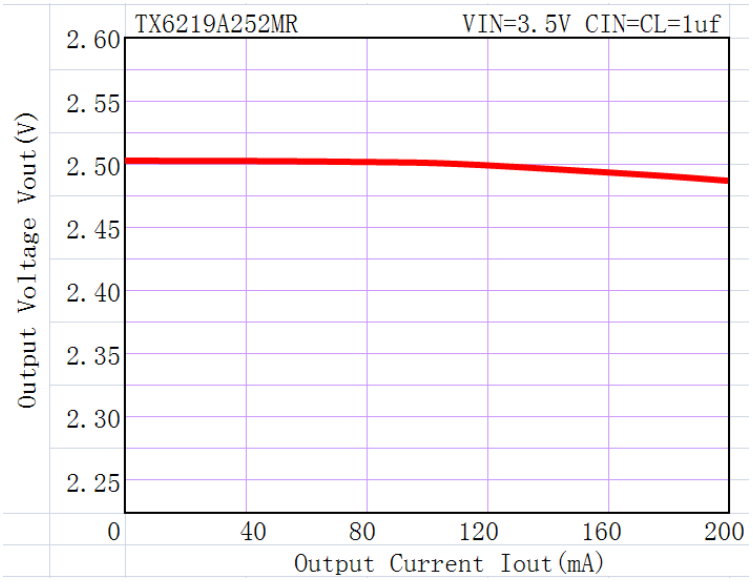
The IC's internal circuitry can be shutdown via the signal from the CE pin with the TX6219 series. In shutdown mode, output at the VOUT pin will be pulled down to the VSS level via R1 & R2. The operational logic of the IC's CE pin is selectable (please refer to the selection guide). Note that as the standard TX6219 type's regulator 1 and 2 are both ' High Active/No Pull-Down', operations will become unstable with the CE pin open. Although the CE pin is equal to an inverter input with CMOS hysteresis, with either the pull-up or pull-down options, the CE pin input current will increase when the IC is in operation. We suggest that you use this IC with either a VIN voltage or a VSS voltage input at the CE pin. If this IC is used with the correct specifications for the CE pin, the operational logic is fixed and the IC will operate normally. However, supply current may increase as a result of through current in the IC's internal circuitry.

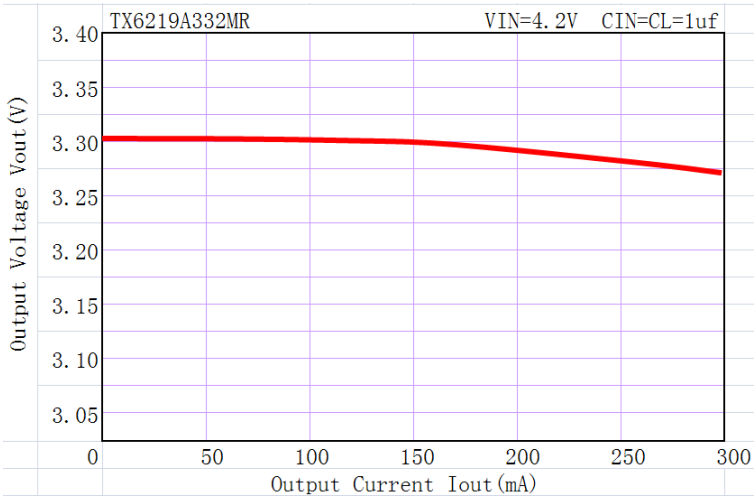
Notes on Use

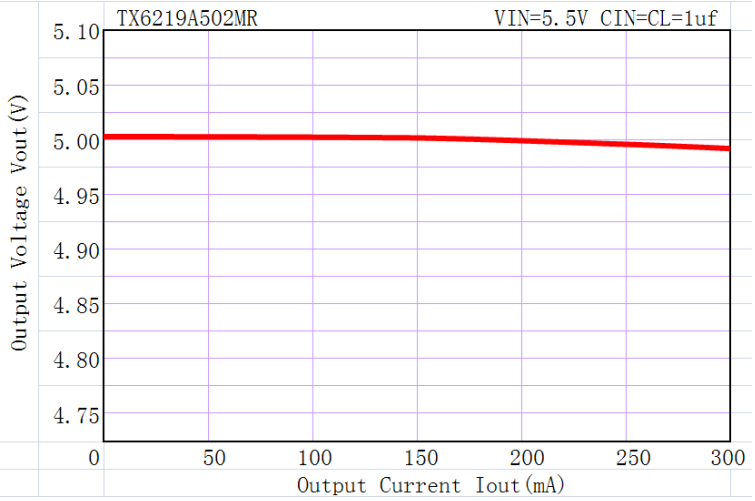
1. Please use this IC within the stated absolute maximum ratings. The IC is liable to malfunction should the ratings be exceeded.
2. Where wiring impedance is high, operations may become unstable due to noise and/or phase lag depending on output current. Please keep the resistance low between VIN and VSS wiring in particular.
3. Please wire the input capacitor (CIN) and the output capacitor (CL) as close to the IC as possible.

Typical Performance Characteristics

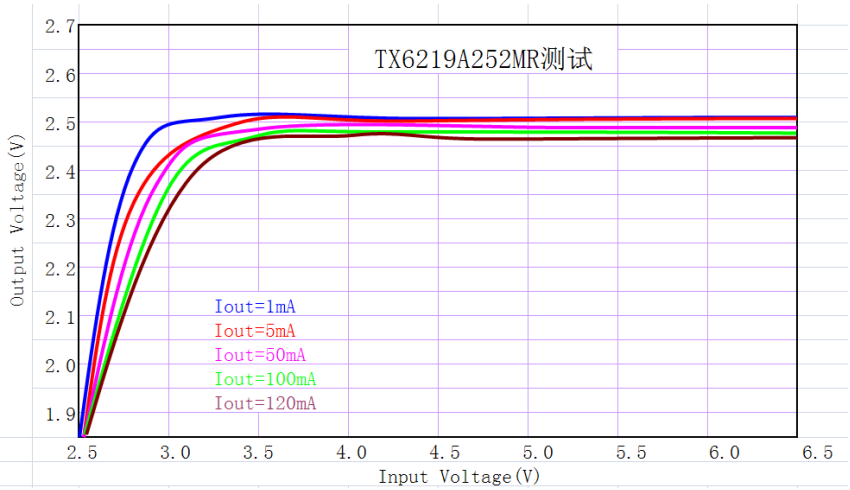
(1) Output Voltage vs.Output Current

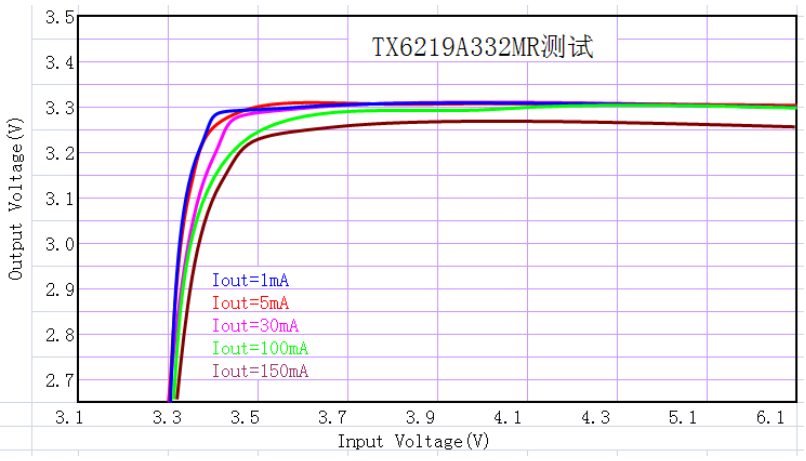


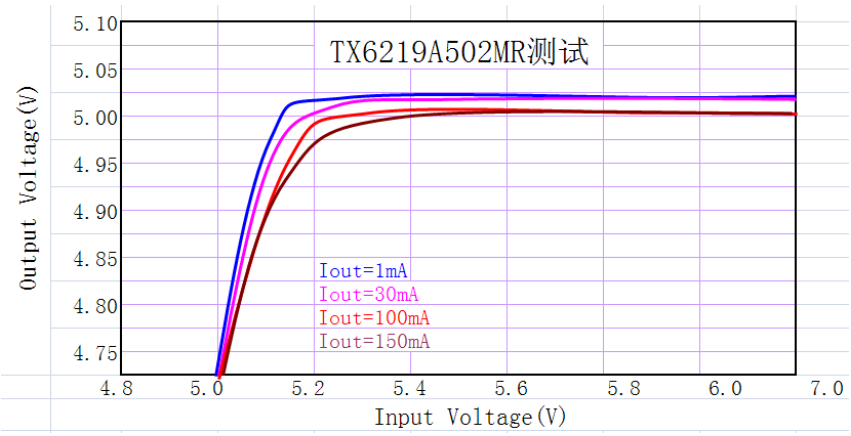




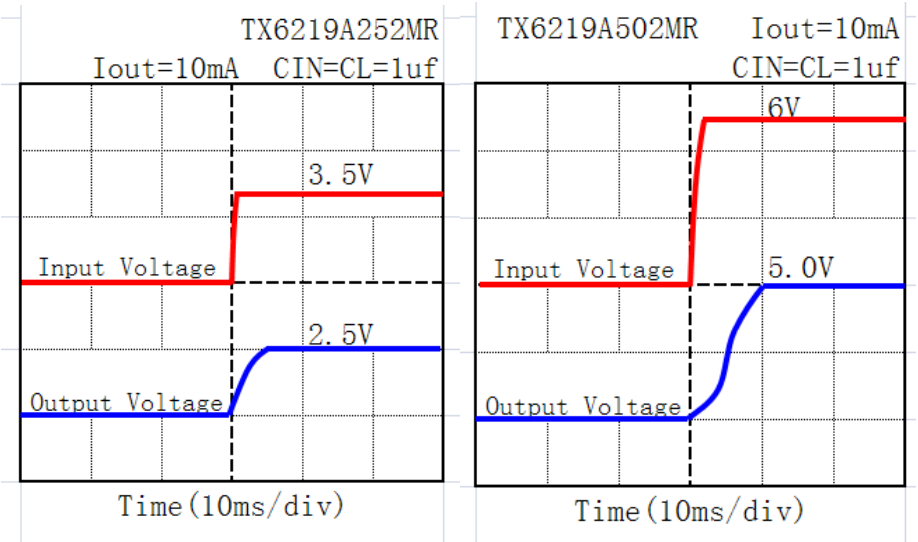
(2) Output Voltage vs. Input Voltage



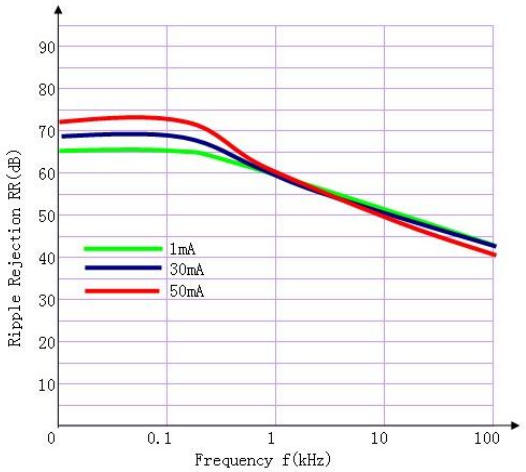




(3) Input Transient Response



(4) Ripple rejection vs. Frequency



(5)MAX Output Current Vs. Input Voltage

TX6219A252MR C_{IN}=C_L=1uF

Input Voltage	Max Output Current
3.0V	215mA
3.2V	290mA
4.0V	135mA
5.0V	130mA
6.0V	120mA
7.0V	105A

TX6219A332MR C_{IN}=C_L=1uF

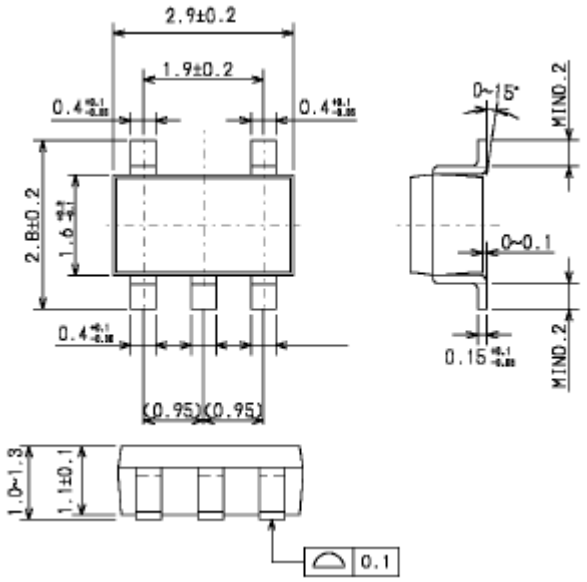
Input Voltage	Max Output Current
4.0V	250mA
4.2V	340mA
5.0V	165mA
6.0V	145mA
7.0V	100mA
8.0V	90mA

TX6219A502MR C_{IN}=C_L=1uF

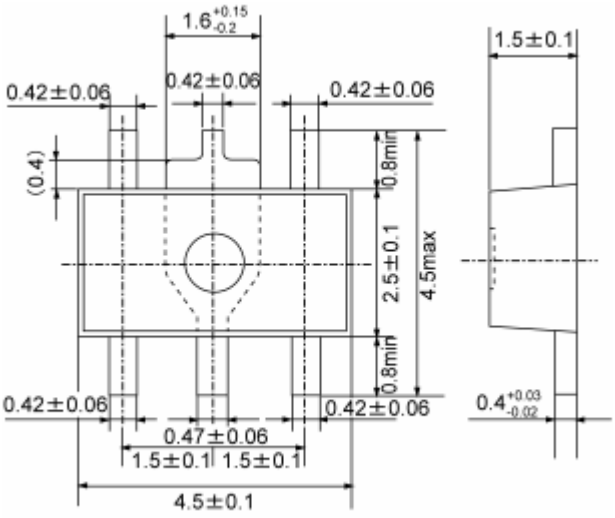
Input Voltage	Max Output Current
5.2V	250mA
5.5V	380mA
6.0V	260mA
7.0V	140mA
8.0V	100mA

Packaging Information

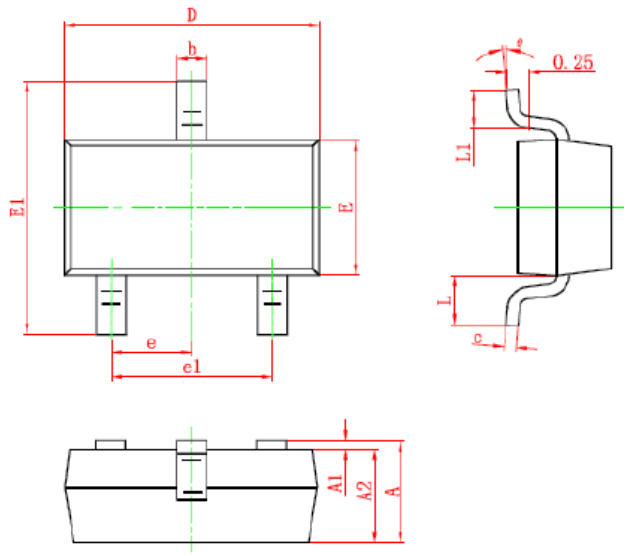
SOT23-5



SOT89-5



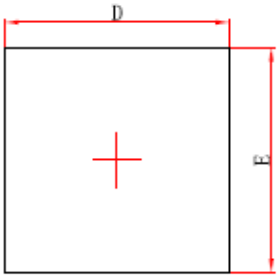
SOT23



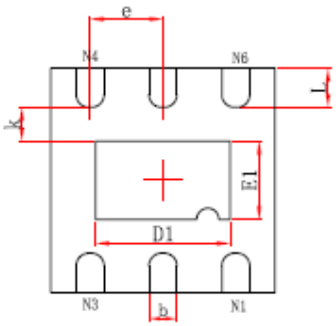
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	6°

DFN2*2

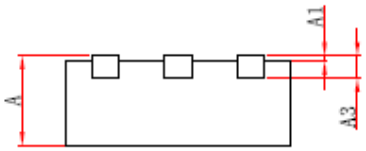
DFNWB2×2-6L(P0.65T0.75/0.85)PACKAGE OUTLINE DIMENSIONS



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.900	2.100	0.075	0.083
E	1.900	2.100	0.075	0.083
D1	1.100	1.300	0.043	0.051
E1	0.600	0.800	0.024	0.031
k	0.200MIN.		0.008MIN.	
b	0.180	0.300	0.007	0.012
e	0.650TYP.		0.026TYP.	
L	0.250	0.450	0.010	0.018