Features

- Low Power Consumption: 0.3uA (Typ)
- Maximum Output Current: 500mA
- Small Dropout Voltage
  100mV@100mA (Vout=3.3V)
- PSRR=70dB@1KHz
- Input Voltage Range: 2.0V~7.0V
- Output Voltage Range: 0.8V~3.6V
  (customized on command in 0.05V steps)
- High Accurate: ±1.5%
- Integrated Short-Circuit Protection
- Good Transient Response
- Over-Temperature Protection
- Support Fixed Output Voltage
- Output Current Limit
- Stable with Ceramic Capacitor
- Available Package
  SOT23-3 \ SOT23-5 \ SOT89-3 \ DFN1x1-4L
- RoHS Compliant and Lead (Pb) Free

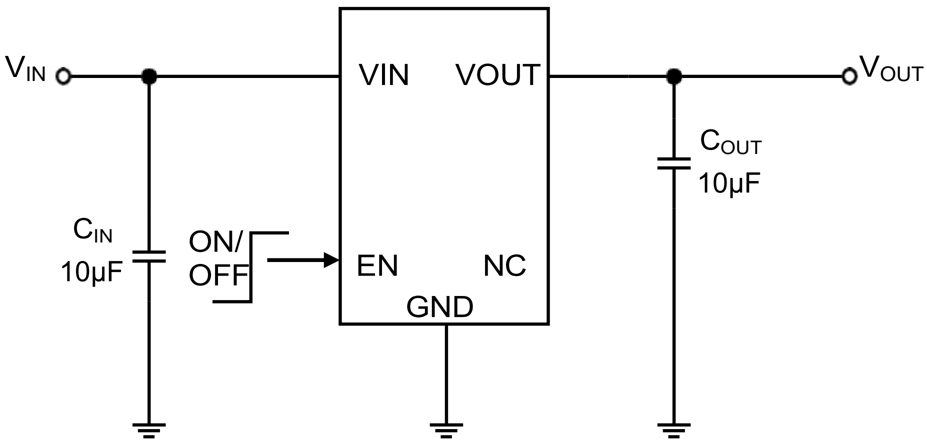
Application

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

Description

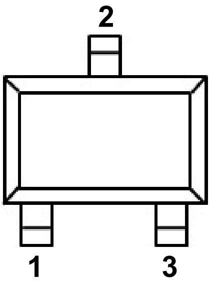
The WL9005 series are highly precise, low noise, positive voltage LDO regulators manufactured using CMOS processes. The series achieves high ripple rejection and low dropout and consists of a standard voltage source, an error correction, current limiter and a phase compensation circuit plus a driver transistor. Output voltage is selectable in 0.05V increments within a range of 0.8V ~ 3.6V. The series is also compatible with low ESR ceramic capacitors which give added output stability.It provides up to 500mA of output current in miniaturized packaging. The features of low quiescent current as low as 0.3μA and almost zero disable current is ideal for powering the battery equipment to a longer service life. The other features include current limit function, Integrated Short-Circuit Protection ,over temperature protection and output discharge function.

Application Circuits

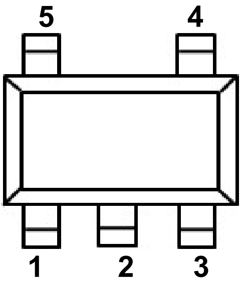


Pin Configuration

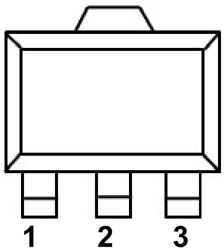
SOT23-3L



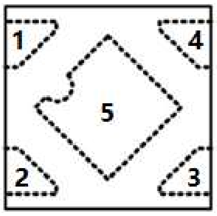
SOT23-5L



SOT89-3L



DFN1x1-4L



Pin Description

Pin No.				Pin Name	Pin Function
SOT23-3L	SOT23-5L	SOT89-3L	DFN1x1-4L		
2	1	2	4	VIN	Supply voltage input.
1	2	1	2	GND	Ground.
-----	3	-----	3	EN	Chip Enable Control Input
-----	4	-----	-----	NC	No Internal Connection.
3	5	3	1	VOUT	Voltage Output.
-----	-----	-----	5	SGND	Substrate of Chip. Leave floating or tie to GND.

Order Information

WL9005①②-③④

Designator	Symbol	Description
①②	S3/S5/P3/D4	SOT23-3L / SOT23-5L / SOT89-3L / DFN1x1-4L
③④	Integer	Output Voltage (09、10、12、15、18、25、28、30、33、36)

Model	Marking**	Description	Package	T/R Qty
WL9005S3-XX*	-----	WL9005 0.3μA IQ ,High PSRR 500mA Low-Dropout LDO	SOT23-3L	3,000 PCS
WL9005S5-XX*	-----		SOT23-5L	3,000 PCS
WL9005P3-XX*	-----		SOT89-3L	1,000 PCS
WL9005D4-XX*	-----		DFN1x1-4L	10,000 PCS

Note：(*) XX Represents the Output Voltage

(**) For marking information, contact our sales representative directly

Absolute Maximum Ratings (1) (2)

Parameter		Symbol	Maximum Rating	Unit
Input Voltage		V_{IN}	V_{SS} -0.3~V_{SS}+9.0	V
		$V_{ON/OFF}$	V_{SS} -0.3~V_{IN}+0.3	V
Output Current		I_{OUT}	550	mA
Output Voltage		V_{OUT}	V_{SS} -0.3~V_{IN}+0.3	V
Power Dissipation	SOT23-3	Pd	400	mW
	SOT23-5		450	
	SOT89-3		500	
	DFN1x1-4L		400	
Thermal Resistance	SOT23-3	$R_{\theta JA}$ (3) (Junction-to-ambient thermal resistance)	250	℃/W
	SOT23-5		220	℃/W
	SOT89-3		200	℃/W
	DFN1x1-4L		250	℃/W
Operating Temperature		T_{opr}	-40~85	℃
Storage Temperature		T_{stg}	-40~125	℃
Soldering Temperature & Time		T_{solder}	260℃, 10s	

Note (1): Exceeding these ratings may damage the device.

Note (2): The device is not guaranteed to function outside of its operating conditions

Note (3): The package thermal impedance is calculated in accordance to JESD 51-7.

ESD Ratings

Item	Description	Value	Unit
$V_{(ESD-HBM)}$	Human Body Model (HBM) ANSI/ESDA/JEDEC JS-001-2014 Classification, Class: 2	±4000	V
$V_{(ESD-CDM)}$	Charged Device Mode (CDM) ANSI/ESDA/JEDEC JS-002-2014 Classification, Class: C0b	±200	V
$I_{LATCH-UP}$	JEDEC STANDARD NO.78E APRIL 2016 Temperature Classification, Class: I	±150	mA

ESD testing is performed according to the respective JESD22 JEDEC standard.The human body model is a 100 pF capacitor discharged through a 1.5kΩ resistor into each pin. The machine model is a 200pF capacitor discharged directly into each pin.

Recommended Operating Conditions

Parameter	MIN.	MAX.	Units
Supply voltage at V_{IN}	2.0	7.0	V
Operating junction temperature range, Tj	-40	125	°C
Operating free air temperature range, TA	-25	85	°C

Note : All limits specified at room temperature (TA = 25°C) unless otherwise specified. All room temperature limits are 100% production tested. All limits at temperature extremes are ensured through correlation using standard Statistical Quality Control (SQC) methods. All limits are used to calculate Average Outgoing Quality Level (AOQL).

Electrical Characteristics

(TestConditions:V_{IN}=4.3V, V_{OUT}=3.3V,C_{IN}=10uF, C_{OUT}=10uF,TA=25℃, unless otherwise specified.)

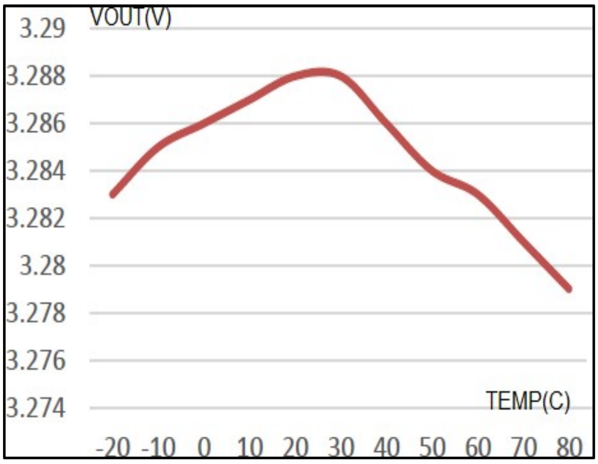
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		2.0	—	7.0	V
Supply Current	I_Q	V_{IN} > V_{OUT} ,EN=V_{IN} I_{LOAD}=0mA	—	0.3	0.7	uA
Standby Current	I_{STBY}	V_{EN} = 0	—	—	0.1	uA
Output Voltage	V_{OUT}	V_{IN}=V_{set}+1.0V I_{OUT}=100mA	Vset*0.985	Vset	Vset*1.015	V
Maximum Output Current	I_{OUT}(Max)	V_{IN}=V_{OUT}+1.0V	—	500	—	mA
Dropout Voltage	V_{DROP}(1)	I_{OUT}=100mA	—	100	—	mV
		I_{OUT}=200mA	—	220	—	
Line Regulation	ΔV_{OUT}/ ΔV_{IN}•V_{OUT}	I_{OUT}=10mA (V_{set}+0.5v)≦V_{IN}≦7.0V	—	0.1	—	%/V
Load Regulation	ΔV_{OUT}	V_{IN}=V_{set}+1.0V 1mA≦I_{OUT}≦100mA	—	20	—	mV
Current Limit	I_{LIMIT}		—	550	—	mA
Short Current	I_{SHORT}	RL=1Ω	—	90	—	mA
Power Supply Rejection Rate	PSRR	V_{IN}=V_{set}+1.0V f=1KHz,I_{OUT}= 100mA	—	70	—	dB
		V_{IN}=V_{set}+1.0V f=10KHz,I_{OUT}= 100mA	—	65	—	dB
EN Threshold Voltage	V_{IL}	V_{IN}=3V~ 5.5V, Shutdown	—	—	0.4	V
	V_{IH}	V_{IN}=3V~ 5.5V, Start-Up	1.2	—	—	V
Output Noise Voltage	e_{NO}	C_{OUT}=1uF BW = 100Hz~10kHz	—	100	—	uV_{RMS}
Output Voltage Temperature Coefficient	ΔV_{OUT}/ ΔT•V_{OUT}	I_{OUT}=30mA	—	±100	—	ppm/℃
Thermal Shutdown Temperature	T_{SD}		—	160	—	℃
Thermal Shutdown Hysteresis	ΔT_{SD}		—	20	—	℃

Note：(1) Dropout Voltage is the voltage difference between the input and the output at which the output voltage drops 2% below its nominal value.

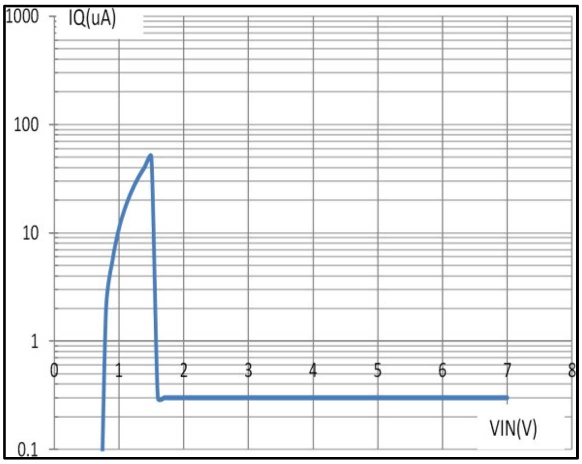
Typical Performance Characteristics

Test Condition: $T_{A=}$25°C, unless otherwise note

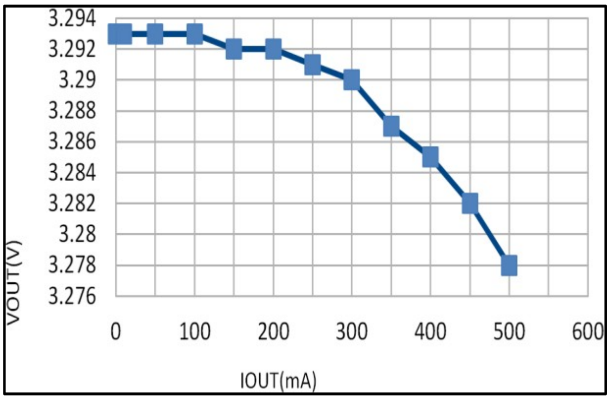
1、VOUT vs TEMP



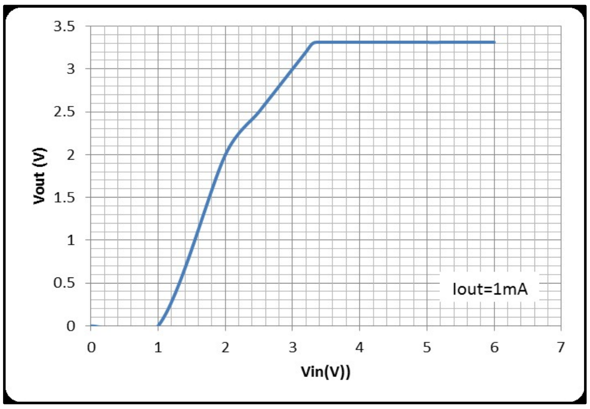
2、IQ vs VIN (※)



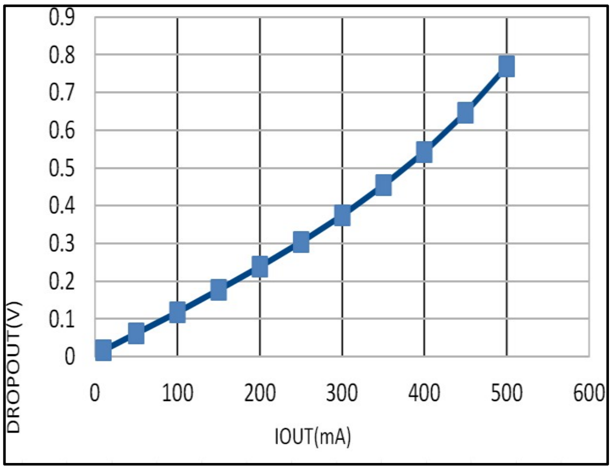
3、Load Regulation



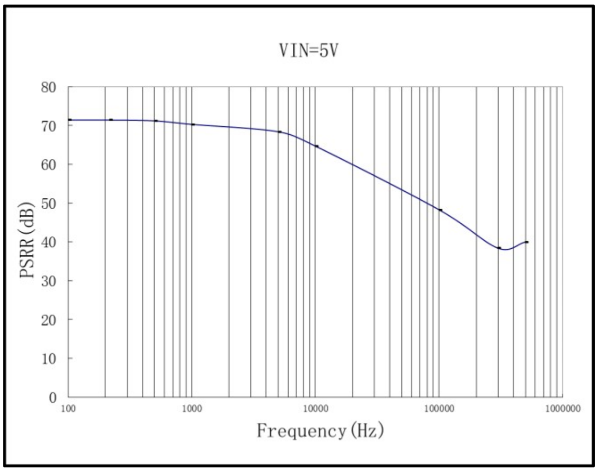
4、Line Regulation



5、Dropout Voltage vs Load Current

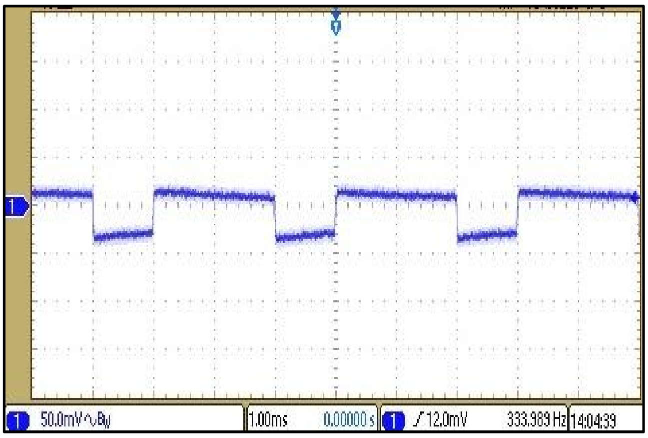


6、PSRR

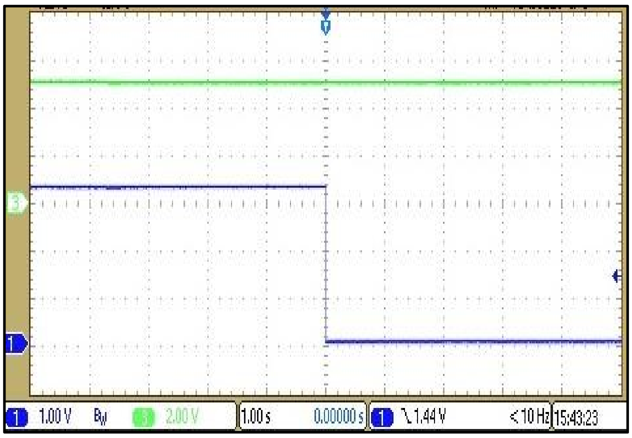


Note：(※)IQ refers to the working current when the chip is no-load, only when Vin >vout The chip will have a very low working current, the above diagram is for Vout 1.5v Measured Curve, when Vin<Vout, the chip is in an abnormal state that can not reach the intended output, therefore, the operating current will increase significantly. For applications where IQ requirements are strict, make sure the chip stops working when Vin <Vout.

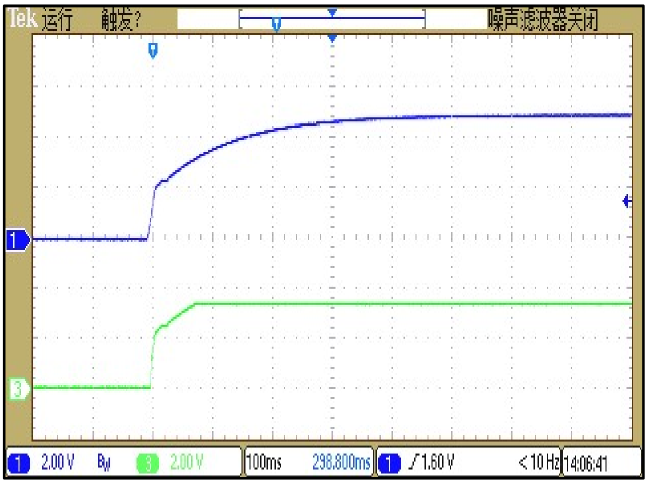
7、Load Transient Response



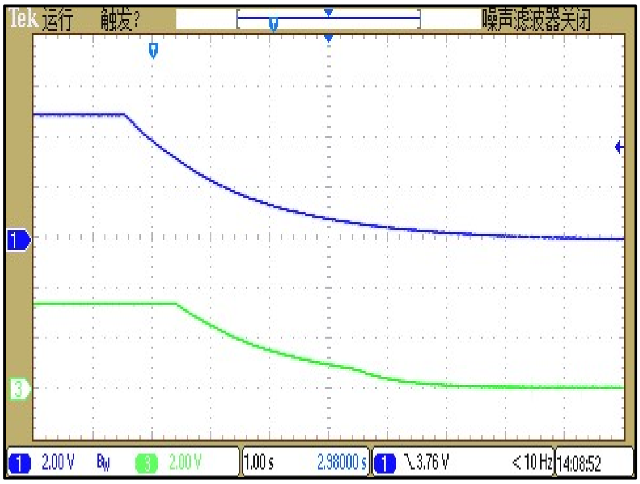
8、Short Output & Over-Current Response



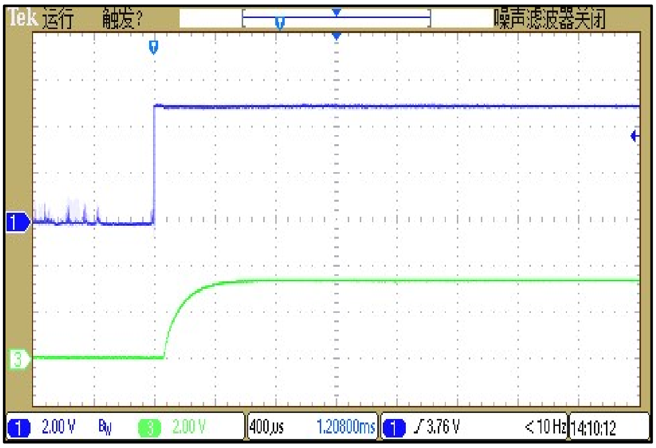
9、Power-On



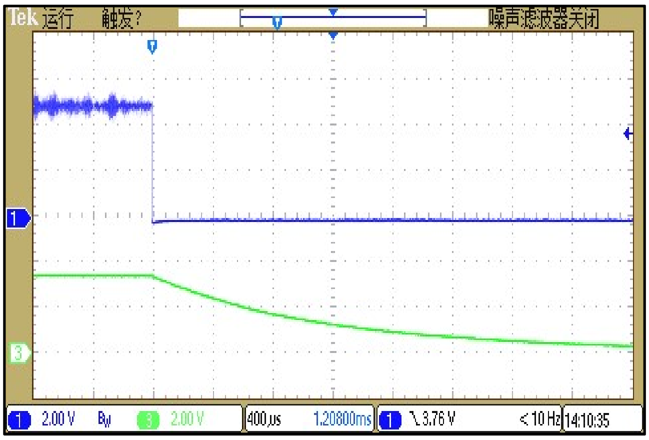
10、Power-Off



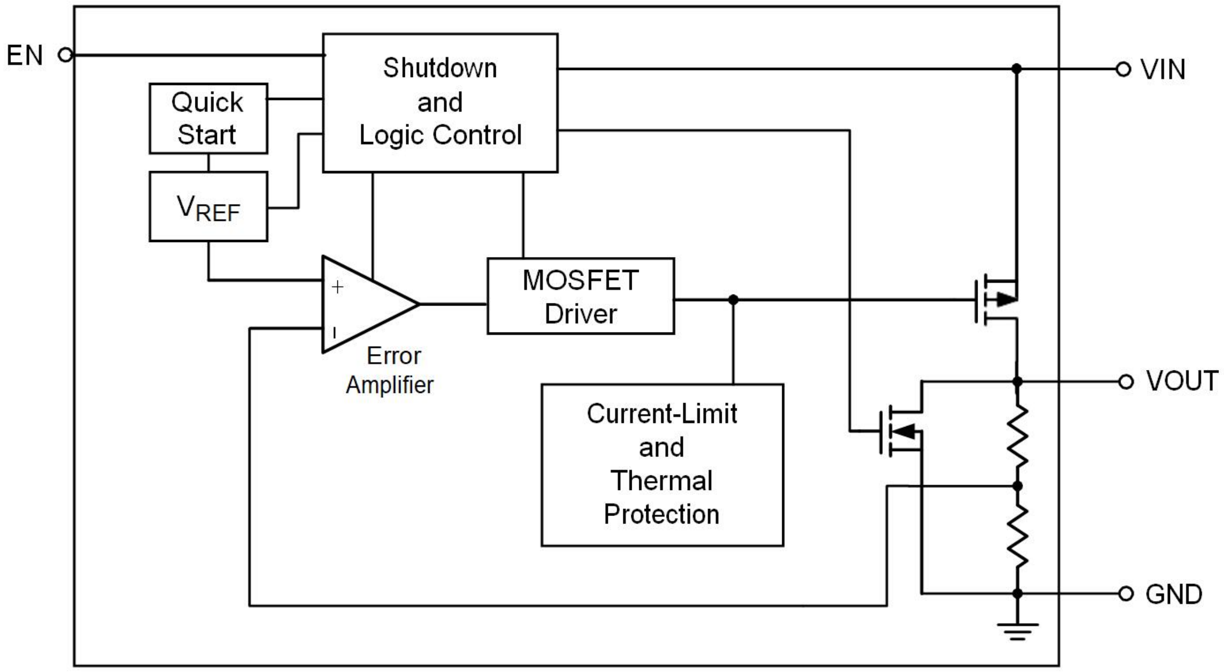
11、Enable



12、Disable



Function Block Diagram



Application Guideline

Input Capacitor

A 1μF ceramic capacitor is recommended to connect between V_{DD} and GND pins to decouple input power supply glitch and noise. The amount of the capacitance may be increased without limit. This input capacitor must be located as close as possible to the device to assure input stability and less noise. For PCB layout, a wide copper trace is required for both VIN and GND.

Output Capacitor

An output capacitor is required for the stability of the LDO. The recommended output capacitance is 10μF, ceramic capacitor is recommended, and temperature characteristics are X7R or X5R. Higher capacitance values help to improve load/line transient response. The output capacitance may be increased to keep low undershoot/overshoot. Place output capacitor as close as possible to VOUT and GND pins.

Dropout Voltage

The dropout voltage refers to the voltage difference between the VIN and VOUT pins while operating at specific output current. The dropout voltage VDROP also can be expressed as the voltage drop on the pass-FET at specific output current (IRATED) while the pass-FET is fully operating at ohmic region and the pass-FET can be characterized asan resistance RDS(ON). Thus the dropout voltage can bedefined as (VDROP = VIN − VOUT = RDS(ON) x IRATED). Fornormal operation, the suggested LDO operating range is (VIN > VOUT + VDROP) for good transient response and PSRR ability. Vice versa, while operating at the ohmic region will degrade the performance severely.

Thermal Application

For continuous operation, do not exceed the absolute maximum junction temperature. The maximum power dissipation depends on the thermal resistance of the IC package, PCB layout, rate of surrounding airflow, and difference between junction and ambient temperature. The maximum power dissipation can be calculated as below: TA=25°C, PCB,

The max PD= (125°C − 25°C) / (Thermal Resistance °C/W)

Power dissipation (PD) is equal to the product of the output current and the voltage drop across the output pass element, as shown in the equation below:

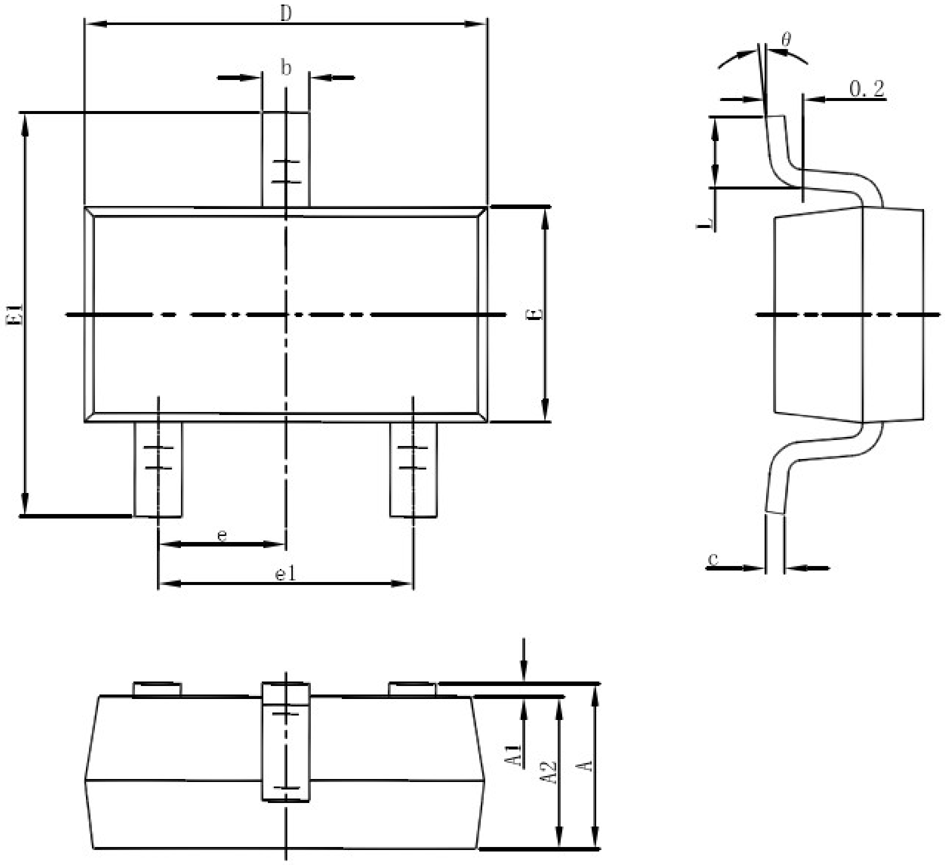
PD = (VIN – VOUT) × IOUT

Layout Consideration

By placing input and output capacitors on the same side of the PCB as the LDO, and placing them as close as is practical to the package can achieve the best performance. The ground connections for input and output capacitors must be back to the WL9005 ground pin using as wide and as short of a copper trace as is practical.Connections using long trace lengths, narrow trace widths, and/or connections through via must be avoided. These add parasitic inductances and resistance that results in worse performance especially during transient conditions.

Packaging Information

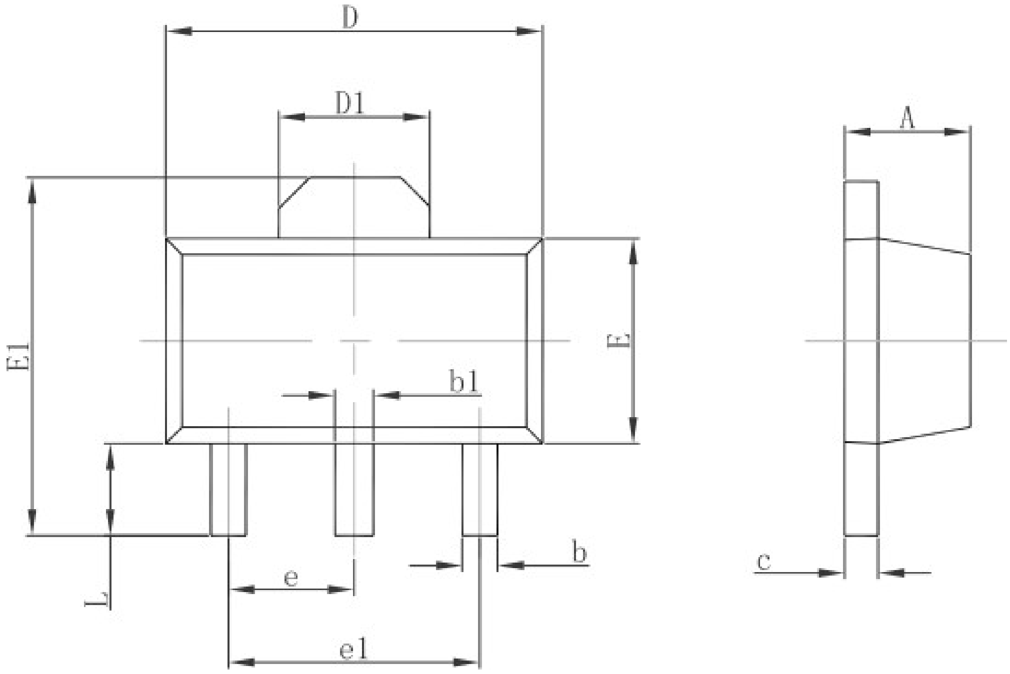
SOT23-3L



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°

Packaging Information

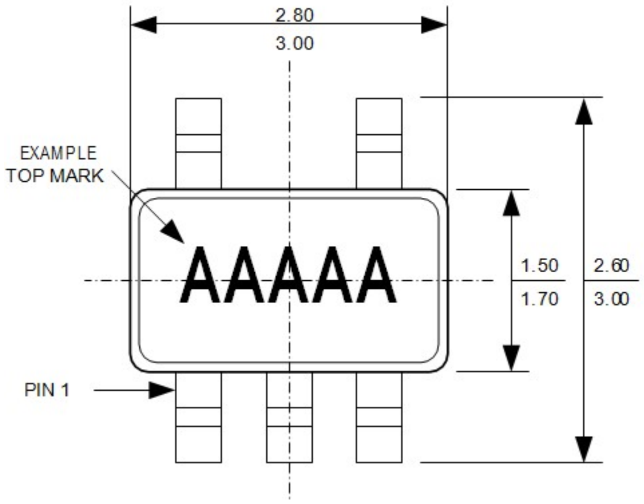
SOT89-3L

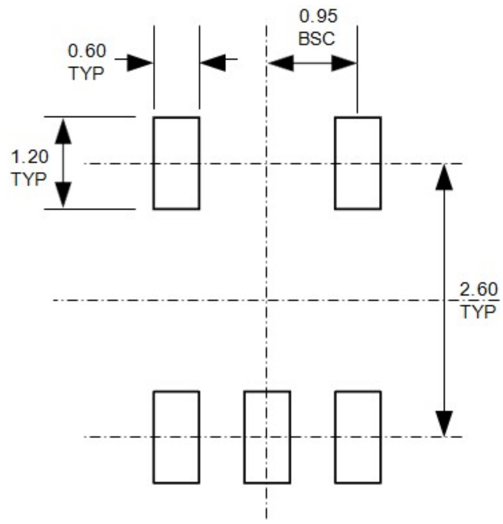


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF.		0.061 REF.	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP.		0.060 TYP.	
e1	3.000 TYP.		0.118 TYP.	
L	0.900	1.200	0.035	0.047

Packaging Information

SOT23-5L



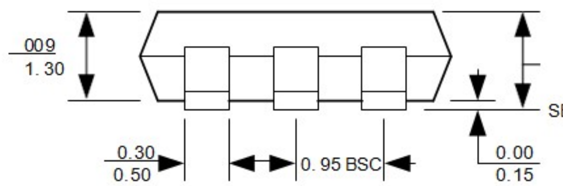


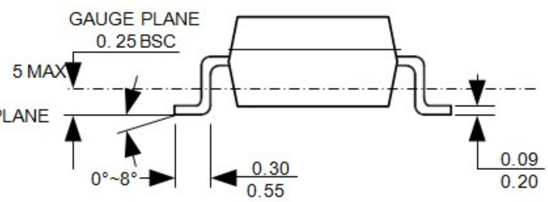
TOP VIEW

RECOMMENDED PAD LAYOUT

TOP VIEW

RECOMMENDED PAD LAYOUT



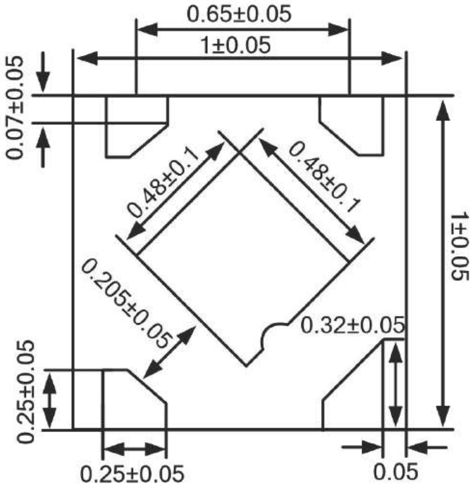


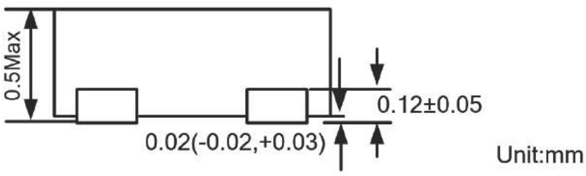
FRONT VIEW

SIDE VIEW

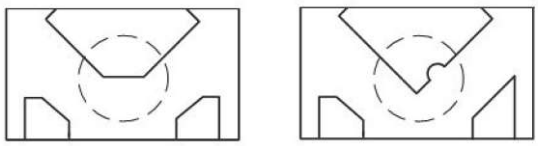
Packaging Information

DFN1x1-4L





Detail A: (PIN1 shape)



Unit:mm