



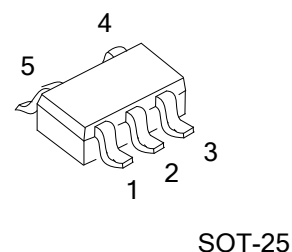
## 1A LOW DROPOUT LINEAR REGULATOR

### DESCRIPTION

The UTC **LR9212** is a high speed LDO regulator that features high accurate, low noise, high ripple rejection, low dropout and low power consumption. Designed with a P-channel MOSFET series pass transistor, the UTC **LR9212** yields extremely low dropout voltage and maintains very low ground current (70 $\mu$ A).

The UTC **LR9212** does not require a bypass capacitor, hence achieving the smallest PCB area.

Other features include foldback overcurrent protection, quick soft start, and overtemperature protection. The UTC **LR9212** is available in fixed output voltage from 0.8V to 3.3V with 0.1V per step or as an adjustable device with a 0.8V reference voltage. The device comes in various packages.



SOT-25

### FEATURES

- \* Wide Input Voltage Range from 2.5V to 5.5V
- \* Ultra Low Dropout Voltage: 300mV @  $V_{OUT} = 3.3V$ , 600mA
- \* Ultra Fast Response in Line/Load Transient
- \* Stable with 1 $\mu$ F Ceramic Output Capacitor
- \* Low Ground Current: 70 $\mu$ A Typical
- \* Low Shutdown Current: <1 $\mu$ A
- \* Foldback Output Current Limit
- \* High Output Accuracy
  - 1.5% Initial Accuracy
  - Fixed Output Voltages: 0.8V~3.3V
  - Adjustable Output Voltage from 0.8V to 4.5V
- \* Over-Temperature Protection

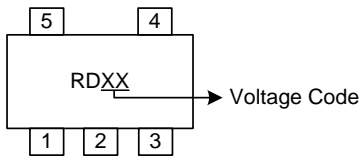
### ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LR9212L-xx-AF5-R	LR9212G-xx-AF5-R	SOT-25	Tape Reel

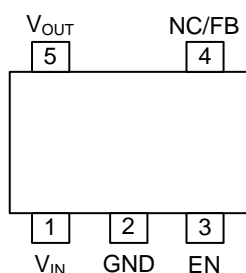
Note: xx: Output Voltage, refer to Marking Information.

LR9212G-xx-AF5-R	(1) Packing Type (2) Package Type (3) Output Voltage Code (4) Green Package	(1) R: Tape Reel (2) AF5: SOT-25 (3) xx: refer to Marking Information (4) G: Halogen Free and Lead Free, L: Lead Free
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## MARKING

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	33: 3.3V AD: ADJ	

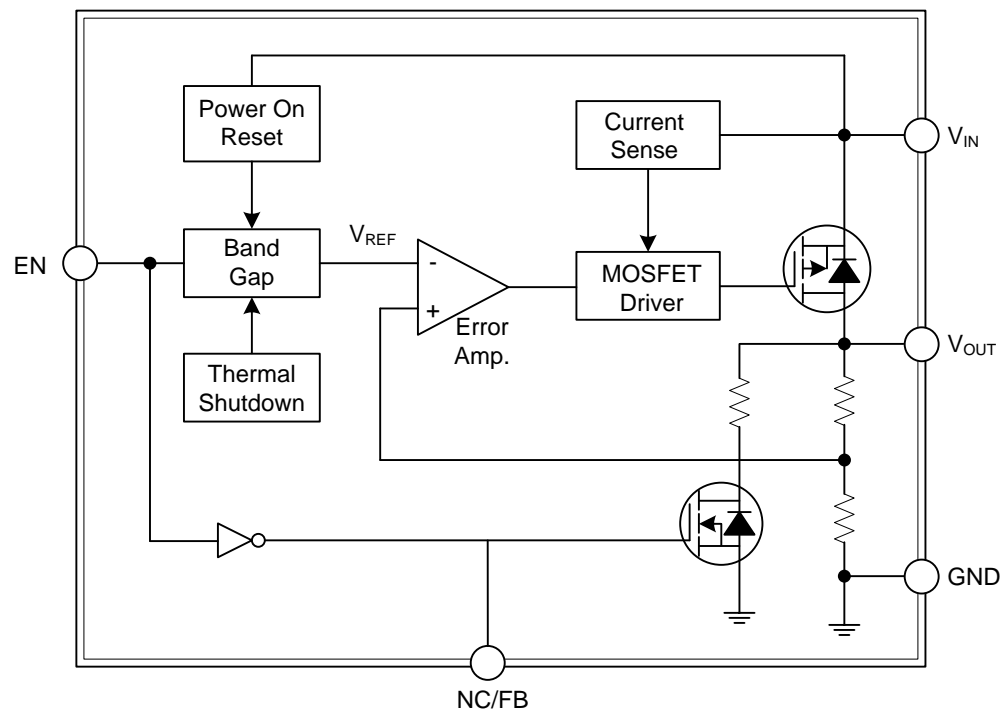
## PIN CONFIGURATION



## PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	V <sub>IN</sub>	Input Voltage. This pin connects to the source of the internal pass transistor that supplies current to the output pin. Bypass VIN to GND with a minimum 1uF ceramic capacitor. Place the decoupling capacitor physically as close as possible to the device.
2	GND	Ground.
3	EN	Enable Input. Pulling this pin below 0.35V turns the regulator off, reducing the quiescent current to a fraction of its operating value. This pin is not available for 3-pin packages.
4	FB/NC	Feedback Pin(ADJ Version). this pin is connected to an external resistor divider, turns to adjustable output voltage; $V_{OUT}=0.8*(R1+R2)/R1(V)$ ; NC Pin(fixed version);
5	V <sub>OUT</sub>	Output Voltage. This pin is power output of the device. A pull low resistance exists when the device is disabled by pulling low the EN pin. To maintain adequate transient response to large load change, a minimum 1uF ceramic capacitor is required to reduce the effects of current transients on VOUT.

## ■ BLOCK DIAGRAM



■ **ABSOLUTE MAXIMUM RATING**

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage (Note 1)	$V_{IN}$	-0.3 ~ +6	V
Other Pins		-0.3 ~ ( $V_{IN}+0.3$ )	V
Power Dissipation ( $T_A=25^{\circ}\text{C}$ )	$P_D$	0.4	W
Junction Temperature	$T_J$	+150	$^{\circ}\text{C}$
Storage Temperature Range	$T_{STG}$	-65 ~ +150	$^{\circ}\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Package Thermal Resistance	$\theta_{JA}$	250	$^{\circ}\text{C/W}$

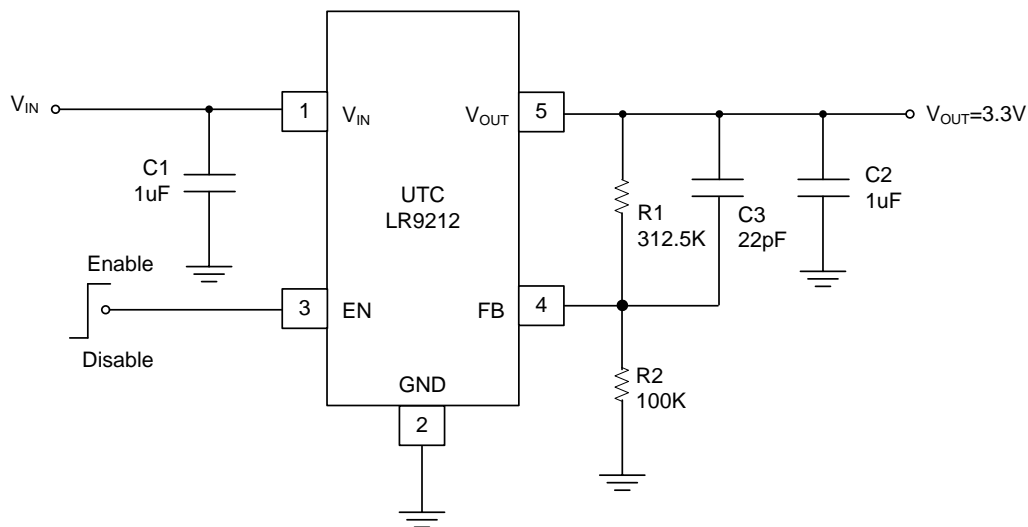
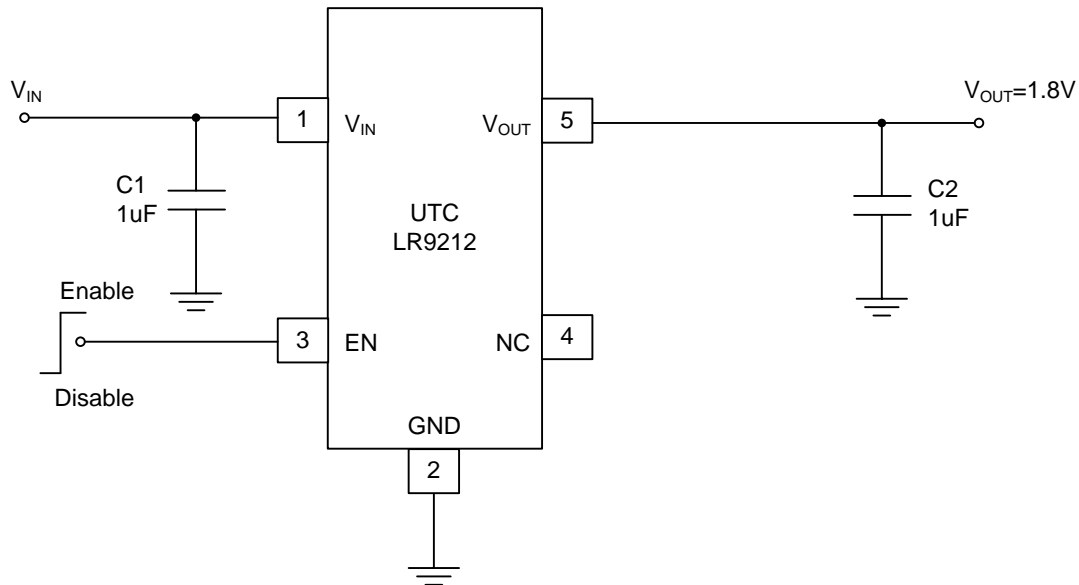
■ **RECOMMENDED OPERATION CONDITIONS**

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Input Voltage	$V_{IN}$	2.5 ~ +5.5	V
Operating Ambient Temperature Range	$T_A$	-20 ~ +85	$^{\circ}\text{C}$
Operating Junction Temperature Range	$T_J$	-20 ~ +125	$^{\circ}\text{C}$

■ **ELECTRICAL CHARACTERISTICS** ( $T_A=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Input Voltage						
Supply Input Voltage	V <sub>IN</sub>		2.5		5.5	V
Quiescent Current	I <sub>Q</sub>	V <sub>EN</sub> =5V, I <sub>OUT</sub> =0mA	40	70	120	μA
Shutdown Current	I <sub>SHDN</sub>	V <sub>EN</sub> =0V		0.1	1	μA
Output Voltage						
Output Voltage Accuracy	V <sub>OUT</sub>	V <sub>IN</sub> =V <sub>NOM</sub> +1.0V, I <sub>OUT</sub> =1mA, fixed output voltage version	-1.5		1.5	%V <sub>NOM</sub>
Reference Voltage Accuracy	V <sub>FB</sub>	V <sub>IN</sub> =3.3V, I <sub>OUT</sub> =1mA, V <sub>out</sub> =FB ADJ output voltage version	0.788	0.80	0.812	V
Output Line Regulation	ΔV <sub>REF (LINE)</sub>	2.5V<V <sub>IN</sub> <5.5V, and V <sub>IN</sub> >V <sub>OUT</sub> +1.0V, I <sub>OUT</sub> =1mA		0.01	0.2	%/V
Output Load Regulation	ΔV <sub>REF (LOAD)</sub>	1mA<I <sub>OUT</sub> <500mA, V <sub>IN</sub> =V <sub>NOM</sub> +1.0V		0.5	2.0	%/A
Dropout Voltage	V <sub>DROP</sub>	I <sub>OUT</sub> =300mA, V <sub>OUT</sub> =3.3V		150	225	mV
		I <sub>OUT</sub> =600mA, V <sub>OUT</sub> =3.3V		300	450	
Power Supply Rejection Ratio	PSRR	Frequency=10Hz, I <sub>OUT</sub> =10mA		68		dB
		Frequency=1kHz, I <sub>OUT</sub> =10mA		65		dB
		Frequency=100kHz, I <sub>OUT</sub> =10mA		45		dB
		Frequency=10Hz, I <sub>OUT</sub> =300mA		48		dB
		Frequency=1kHz, I <sub>OUT</sub> =300mA		62		dB
		Frequency=100kHz, I <sub>OUT</sub> =300mA		40		dB
Enable						
Enable High Level	V <sub>EN</sub>		1.2			V
Disable Low Level	V <sub>SD</sub>				0.35	V
EN Input Current	I <sub>EN</sub>	V <sub>IN</sub> =5.5V, V <sub>EN</sub> =5.5V or 0V	-1		1	μA
Enable Delay Time	T <sub>DELAY</sub>	from V <sub>EN</sub> >1.2V to V <sub>OUT</sub> >10%V <sub>NOM</sub> , by design		35		us
Output Ramp Up Time	T <sub>SS</sub>	from V <sub>OUT</sub> =10% to 90% of V <sub>NOM</sub> , by design		45		us
Protection						
Current Limit Threshold	I <sub>LIM</sub>		1.2	2		A
Short Circuit Current			0.8			A
Thermal Shutdown Temperature	T <sub>SD</sub>	I <sub>OUT</sub> =0mA, V <sub>IN</sub> =V <sub>EN</sub> =5.5V		170		°C
Thermal Shutdown Hysteresis	T <sub>SDHYS</sub>	I <sub>OUT</sub> =0mA, V <sub>IN</sub> =V <sub>EN</sub> =5.5V		10		°C

# ■ TYPICAL APPLICATION CIRCUIT



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