

## Features

- Output Current Up to 500mA
- Low Dropout Voltage Typically 1V at 500mA Output Current Application
- Low Quiescent Current:2.5uA
- Operating Input Voltage Range: 3.0V to 24V
- Fixed Output Voltage Options:1.5V to 5.0V
- $\pm 2\%$  Initial Voltage Accuracy
- Fast Transient Response Over Line and Load Transient
- High PSRR: 90dB at 1KHz
- Build Internal Soft-Start
- Over Current Protection and Short-circuit Protection
- Over-temperature Protection
- Green Product RoHS Compliant and Halogen Free
- ESD Protected up to 2KV(HBM),200V(CDM)

## Applications

- Vehicular Equipment
- Battery-powered Equipment
- Telecom Infrastructure
- Microprocessor and Chipset Supplies
- Home Applications
- Industrial Automation Supplies
- Servers Device Applications

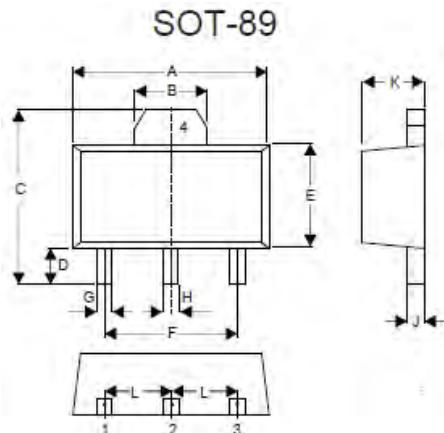
## Description

The MCL9913F is a 500mA low dropout linear voltage regulator with 2.5uA low quiescent current, operating input voltage up to 24V, and offering fixed output voltage ranges from 1.5V to 5.0V. Also, the device is designed for use in applications requiring high input voltage in the EN Pin to enable and disable the linear regulator. Integrating many functions the MCL9913F provides high power supply rejection, and owns excellent line and load transient response with only a small 1uF~10uF ceramic output capacitor. Building internal soft-start minimizes stress on the input power source by reducing capacities inrush current during start-up time. The functions of thermal shutdown, over current and short-circuit protection to protect the device against thermal and current over-loads. A wide fixed output voltage options, making the MCL9913F a very common solution in different applications.

## Part Number and Marking Code

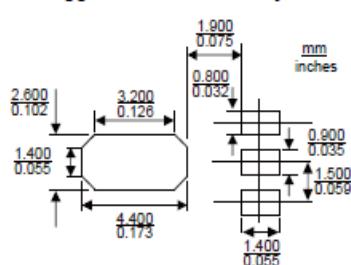
Part No	Marking
MCL9913FM30	ITE9913 YYXX30
MCL9913FM33	ITE9913 YYXX33
MCL9913FM50	ITE9913 YYXX50

# 500mA Low Drop-out Voltage Regulators

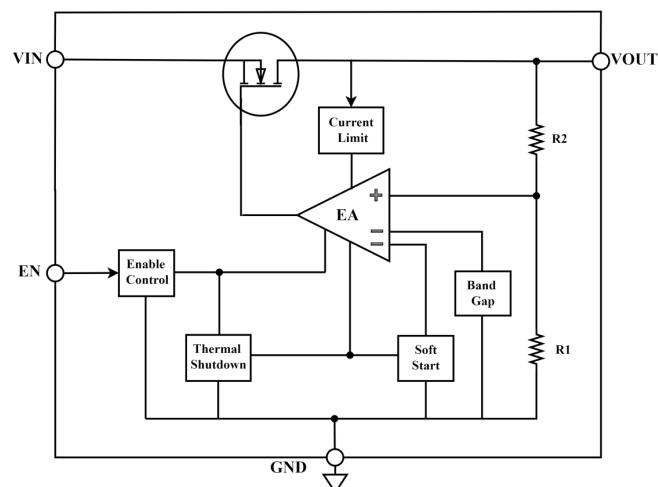


DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.169	0.185	4.30	4.70	
B	0.061		1.55		TYP.
C	0.154	0.171	3.91	4.35	
D	0.031	0.047	0.80	1.20	
E	0.089	0.104	2.25	2.65	
F	0.118		3.00		TYP.
G	0.013	0.020	0.33	0.52	
H	0.015	0.021	0.38	0.53	
J	0.014	0.017	0.35	0.44	
K	0.055	0.063	1.40	1.60	
L	0.059		1.50		TYP.

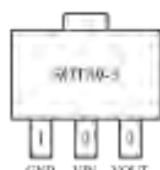
### Suggested Solder Pad Layout



## Functional Block Diagram



## Pin Configuration and Functions (Top View)



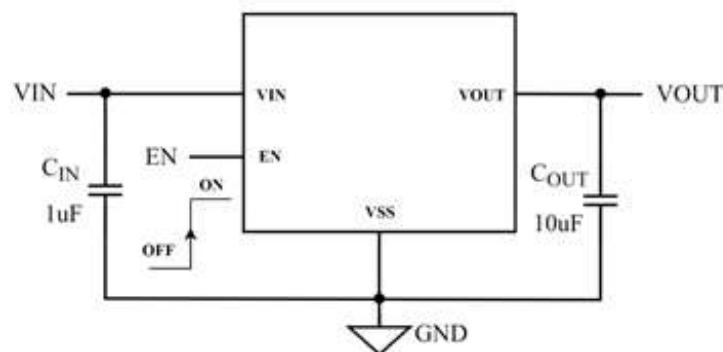
MCL9913FM



MCL9913FE

Name	Description
VIN	Supply input voltage. A 1 $\mu$ F ceramic capacitor is recommended at this pin.
GND	IC Ground.
VOUT	Output Voltage. The power output of the device. A 10 $\mu$ F ceramic capacitor is recommended at this pin.

## Typical Application Circuit



**Absolute Maximum Ratings**

- Operating Temperature Range: -40~+85°C
- Storage Temperature Range: -65~+150°C

Symbol	Parameter	Min	Max	Unit
$V_{IN}$	Supply Voltage	-0.3	36	V
$V_{OUT}$	Output Voltage	-0.3	6	V
$V_{EN}$	Enable Voltage	-0.3	45	V
$T_{LEAD}$	Lead Temperature Soldering Time		260°C, 10s	°C

**Electrical Characteristics**
 $(V_{IN}=5.0V, C_{IN}=10\mu F, C_{OUT}=10\mu F, T_A=25°C, \text{unless otherwise specified})$ 

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Supply Voltage</b>						
$V_{IN}$	Input Voltage	$V_{IN}$ Input Range, $V_{OUT}=V_{FB}$	3.0		24	V
$V_{IN\_H}$	$V_{IN}$ POR Rising Threshold	$I_{OUT}=1.0mA$		1.6		V
$V_{IN\_L}$	$V_{IN}$ POR Hysteresis	$I_{OUT}=1.0mA$		60		mV
$I_{GND}$	Quiescent Current	$V_{IN}=12V, I_{OUT}=0A$		2.5		uA
$I_{SD}$	Shutdown Current	$V_{IN}=12V, EN=0V$		0.2	1.0	uA
<b>Output Voltage</b>						
$V_{OUT}$	Output Voltage Accuracy	$V_{IN}=12V, I_{OUT}=10mA$	-2.0		+2.0	%
$\Delta V_{LOAD}$	Load Regulation	$V_{IN}=12V, 1mA \leq I_{OUT} \leq 100mA$		0.02		%/mA
$\Delta V_{LINE\_VIN}$	Line Regulation	Set $V_{OUT}+0.5V \leq V_{IN} \leq 24V, I_{OUT}=1mA$		0.01		%/V
$V_{DROP}$	Dropout Voltage	$V_{OUT}=5V, I_{OUT}=50mA$		62.5		mV
		$V_{OUT}=5V, I_{OUT}=100mA$		125		mV
<b>Enable</b>						
$I_{EN}$	EN Input Bias Current	$V_{IN}=V_{EN}=12V$			1.0	uA
$V_{ENH}$	EN Input Voltage High	$V_{IN}=12V, I_{OUT}=10mA$	1.4			V
$V_{ENL}$	EN Input Voltage Low	$V_{IN}=12V, I_{OUT}=10mA$			0.4	V
<b>PSRR</b>						
$PSRR$	Ripple Rejection	$V_{IN}=12V, V_{OUT}=3.3V, I_{OUT}=10mA, F=1KHz$		90		dB
<b>Output Current Protection</b>						
$I_{OUT\_MAX}$	Output Current	$V_{IN}=12V$	500			mA
$I_{OCP}$	Limit Current	$V_{IN}=12V$		830		mA
$I_{SHORT}$	Short Current	$V_{IN}=12V, V_{OUT}<0.2V$		430		mA
$T_{SS}$	Soft Start Time	$V_{IN}=12V, V_{OUT}=5V, I_{OUT}=0A$		280		uS
<b>Enable</b>						
$I_{EN}$	EN Input Bias Current	$V_{IN} = V_{EN} = 12V$			1.0	μA
$V_{EN\_H}$	EN Input Voltage High	$V_{IN} = 5V, I_{OUT} = 10mA$	1.2			V
$V_{EN\_L}$	EN Input Voltage Low	$V_{IN} = 5V, I_{OUT} = 10mA$			0.4	V
$R_{DIS}$	ShutdownAuto-Discharge Resistance	$EN=0V, V_{IN}=5V$		2.44		KΩ
<b>Thermal Shutdown</b>						
$T_{SD}$	Thermal Shutdown Temperature	$T_J$ Rising		150		°C
$T_{SR}$	Thermal Shutdown Returned Temperature			130		°C

## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 1Kpcs/Reel

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