Linear Voltage Regulator – LM140K-12

Positive fixed 1.5A output Voltage Regulator in bare die form

Rev 1.0
06/12/19

Description

The LM140K-12 is a 3-terminal fixed 12V positive regulator. The device supplies up to 1.5A of output current and requires only x1 external compensation capacitor at the output. Overload immunity features include internal current limiting, safe-area compensation + thermal shutdown. The LM140K-12 can be used with external components to obtain adjustable voltages or currents and can also be used as the power-pass element in precision high-current voltage regulators. The part is performance rated over the full military temperature range.

Features:

- ±4% V_{OUT} tolerance
- 1.5A Output Current
- Internal thermal overload protection
- Internal short-circuit current limit
- High ripple rejection
- Full military temperature range
- Negative voltage complement is LM120K-12

Ordering Information

The following part suffixes apply:

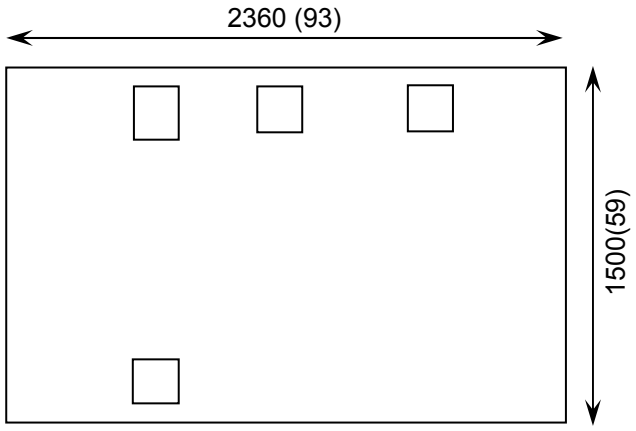
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

LAT = Lot Acceptance Test.

For further information on LAT process flows see below.

www.siliconsupplies.com\quality\bare-die-lot-qualification

Die Dimensions in µm (mils)



Supply Formats:

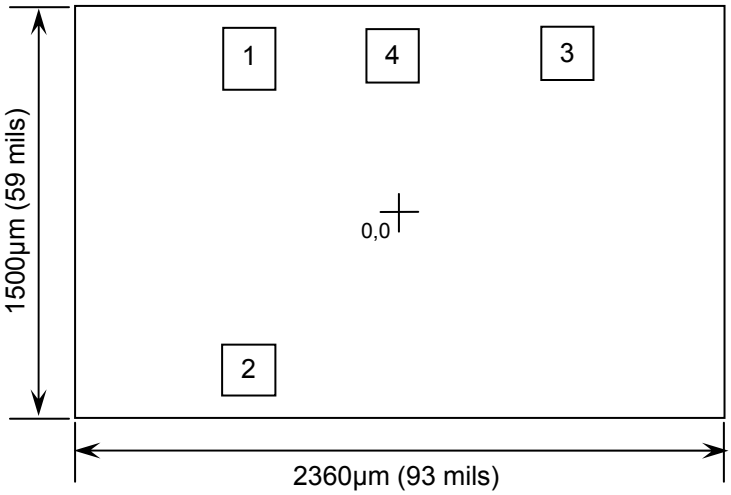
- Default – Die in Waffle Pack (100 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- Tape & Reel – On request
- In Metal or Ceramic package – On request

Mechanical Specification

Die Size (Unsawn)	2360 x 1500 93 x 59	µm mils
Minimum Bond Pad Size	185 x 185 7.28 x 7.28	µm mils
Die Thickness	280 (±20) 11.02 (±0.79)	µm mils
Top Metal Composition	Al 1%Si 2.2µm	
Back Metal Composition	Ti/Ni/Ag 0.1-0.5-0.6µm	

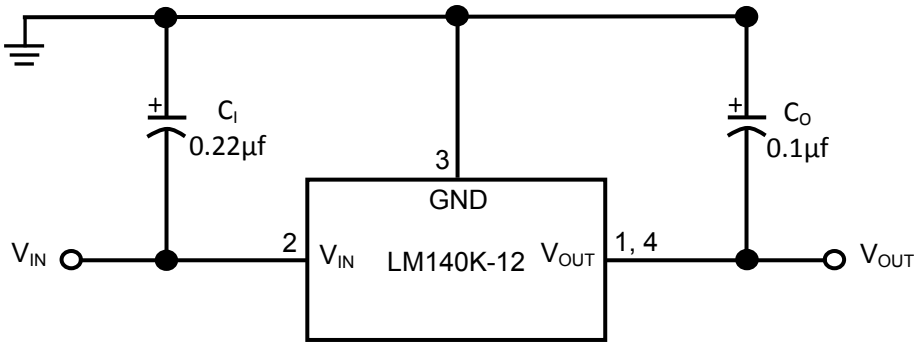
Rev 1.0
06/12/19

Pad Layout and Functions



PAD	FUNCTION	COORDINATES (µm)	
		X	Y
1	V_{OUT}	-546	558
2	V_{IN}	-546	-578
3	GND	610	575
4	V_{OUT}	-25	572
CONNECT CHIP BACK TO GND			

Typical Application



C_I is required if the regulator is located an appreciable distance from power supply filter. C_O is required for stability. For optimum stability and transient response locate C_I C_O as close as possible to the regulator.

Figure 1 – Fixed Regulator

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06/12/19

Absolute Maximum Ratings[1]

PARAMETER	SYMBOL	VALUE	UNIT
Input Voltage	V_{IN}	35	V
Power Dissipation	P_D	Internally Limited	
Operating Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-65 to 150	°C

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage	V_{IN}	14.5	30	V
Output Current	I_{OUT}	0.01	1.5A	A
Operating Junction Temperature Range (Full Range)	T_J	-55 to 125		°C

DC Electrical Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	V_{IN} = 19V, 5mA ≤ I_{OUT} ≤ 1A	T_J = 25°C	11.50	12	12.50	V
		V_{IN} = 15.5V ≤ V_{IN} ≤ 27V, 5mA ≤ I_{OUT} ≤ 1A, P_D ≤ 15W	Full Range	11.40	-	12.60	V
		V_{IN} = 35V, 5mA ≤ I_{OUT} ≤ 50mA	Full Range	11.40	-	12.60	V
Line Regulation	ΔV_{OUT}	V_{IN} = 15V ≤ V_{IN} ≤ 35V, I_{OUT} = 50mA	Full Range	-	-	360	mV
		V_{IN} = 15V ≤ V_{IN} ≤ 32V, I_{OUT} = 350mA	Full Range	-	-	120	mV
		14.5V ≤ V_{IN} ≤ 30V, I_{OUT} = 500mA	T_J = 25°C	-	4	120	mV
		V_{IN} = 15V ≤ V_{IN} ≤ 27V, I_{OUT} = 500mA	Full Range	-	-	120	mV
		14.6V ≤ V_{IN} ≤ 27V, I_{OUT} = 1A	T_J = 25°C	-	-	120	mV
		16V ≤ V_{IN} ≤ 22V, I_{OUT} = 1A	Full Range	-	-	60	mV

1. Operation above the absolute maximum rating may cause device failure. Operation at the absolute maximum ratings, for extended periods, may reduce device reliability.

DC Electrical Characteristics continued

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Load Regulation	ΔV_{OUT}	V_{IN} = 35V, 5mA ≤ I_{OUT} ≤ 50mA	Full Range	-	-	360	mV
		V_{IN} = 19V, 0.25A ≤ I_{OUT} ≤ 0.75A	T_J = 25°C	-	-	60	mV
		V_{IN} = 17V, 5mA ≤ I_{OUT} ≤ 0.5A	Full Range	-	-	240	mV
		V_{IN} = 19V, 5mA ≤ I_{OUT} ≤ 1.5A	T_J = 25°C	-	12	120	mV
		V_{IN} = 19V, 5mA ≤ I_{OUT} ≤ 1A	Full Range	-	-	120	mV
Quiescent Current	I_Q	V_{IN} = 19V, I_{OUT} = 1A	T_J = 25°C	-	-	6	mA
			Full Range	-	-	7	
Quiescent Current Change	ΔI_Q	V_{IN} = 19V, 5mA ≤ I_{OUT} ≤ 1A	Full Range	-	-	0.5	mA
		15V ≤ V_{IN} ≤ 27V, I_{OUT} = ≤ 1A	T_J = 25°C	-	-	0.8	
		15V ≤ V_{IN} ≤ 30V, I_{OUT} = 0.5A	Full Range	-	-	0.8	
Output Noise Voltage	V_n	V_{IN} = 19V, I_{OUT} = 5mA 10 Hz ≤ f ≤ 100 kHz	T_A = 25°C	-	75	-	µV
Short-Circuit Current	I_{OS}	V_{IN} = 17V	T_J = 25°C	-	-	3.5	A
		V_{IN} = 35V	T_J = 25°C	-	-	2	

AC Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Ripple Rejection	RR	V_{IN} = 19V, I_{OUT} = 350mA V_{RIPPLE} = 1V_{RMS} , f_{RIPPLE} = 120Hz, T_A = 25°C	61	-	-	dB