Linear Voltage Regulator – 78L05

Positive Fixed 5V Voltage Regulator in bare die form

Rev 1.0
06/07/22

Description

The 78L05 is a 5V fixed 3-terminal voltage regulator delivering up to 100mA of output current and equipped with internal limiting + thermal shutdown features for overload immunity. Implementing this device at point-of-source removes the complexity of single point regulation methods with reduced noise. Used in replacement of a Zener diode/resistor combination, the device improves output impedance by x2 order of magnitude and delivers lower bias current with lower noise. The 78L05 can also be used with power-pass elements to make high-current voltage regulators.

Features:

- ±5% V_{OUT} tolerance over entire temperature range
- 100mA Output Current
- Internal thermal overload protection
- Internal short circuit current limit
- Full military temperature range
- Industry smallest die size
- Negative Voltage complement is 79L05

Ordering Information

The following part suffixes apply:

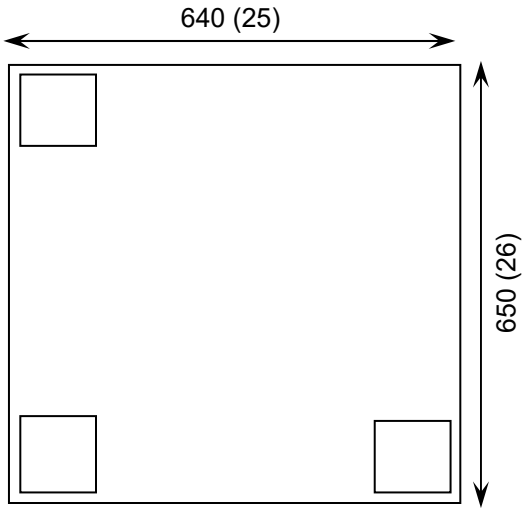
- No suffix - MIL-STD-883 /2010B Visual Inspection
- "**H**" - MIL-STD-883 /2010B Visual Inspection
  + MIL-PRF-38534 Class H LAT
- "**K**" - MIL-STD-883 /2010A Visual Inspection (Space)
  + MIL-PRF-38534 Class K LAT

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 (400 per tray capacity)
- Sawn Wafer on Tape – On request
- Unsawn Wafer – On request
- With Ti/Ni/Ag Back Metal – On request
- In Metal or Ceramic package – On request

Mechanical Specification

Die Size (Unsawn)	640 x 650 25.20 x 25.59	µm mils
Minimum Bond Pad Size	90 x 90 3.54x 3.54	µm mils
Die Thickness	280 (±20) 11 (±0.8)	µm mils
Top Metal Composition	Al 1%Si 1.4µm	
Back Metal Composition	N/A – Bare Si	

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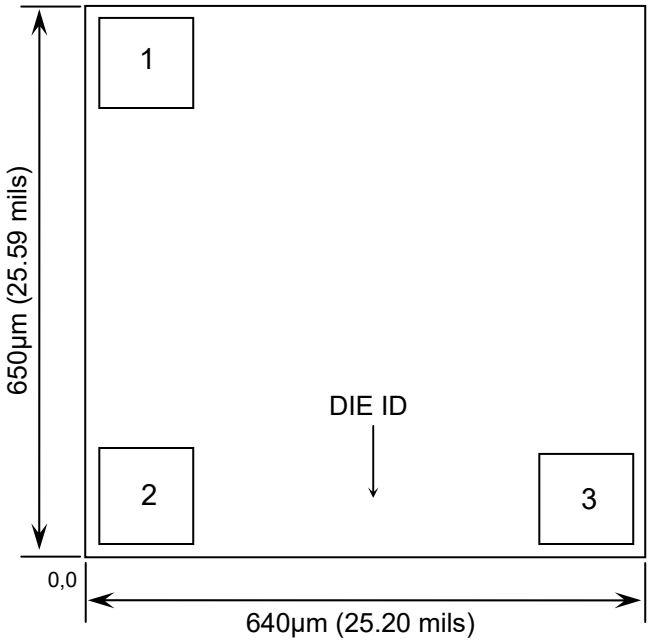
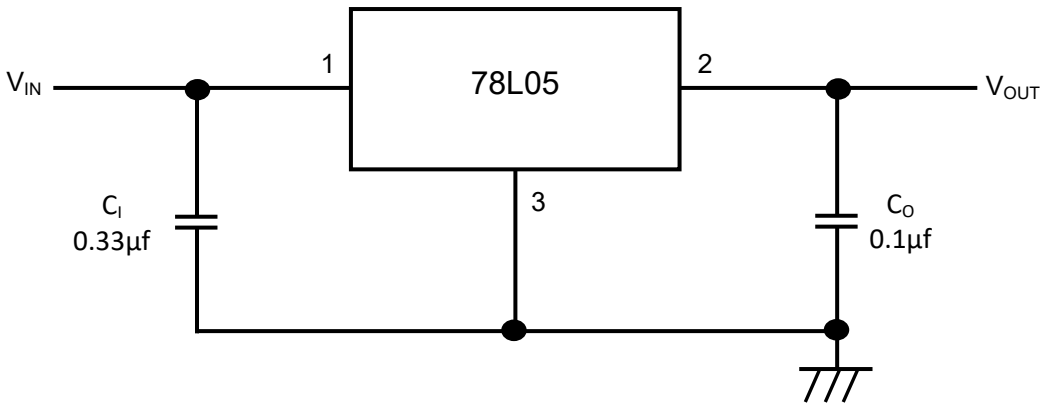
Pad Layout and Functions



PAD	FUNCTION	COORDINATES (µm)	
		X	Y
1	V_{IN}	57	490.5
2	V_{OUT}	58.5	61
3	GND	503	61
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 not required for stability; however it does improve transient response. For optimum stability and transient response locate C_I C_O as close as possible to the regulator.

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Absolute Maximum Ratings

PARAMETER	SYMBOL	VALUE	UNIT
Input Voltage	V_{IN}	30	V
Power Dissipation[1]	P_D	620	mW
Operating Temperature Range	-	-55 to 125	°C
Maximum Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-65 to 150	°C

Recommened Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage	V_{IN}	7	20	V
Output Current	I_{OUT}	-	100	mA
Operating Temperature Range	T_J	-55	125	°C

DC Electrical Characteristics

V_I =10V, I_{OUT}=40mA,C_I=0.33µF, C_O=0.1µf, 0°C<T_J<+125°C(unless noted otherwise)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage	V_{OUT}	T_J = 25°C, 1mA ≤ I_O ≤ 70mA	4.80	5.00	5.20	V
		1mA ≤ I_{OUT} ≤ 40mA, 7V ≤ V_{IN} ≤ 20V	4.75	5.00	5.25	
		1mA ≤ I_{OUT} ≤ 70mA, V_{IN} = 10V	4.75	5.00	5.25	
Line Regulation	ΔV_{OUT}	7V ≤ V_{IN} ≤ 20V, T_J = 25°C, I_O=40mA	-	13	135	mV
		8V ≤ V_{IN} ≤ 20V, T_J = 25°C, I_O=40mA	-	9	90	
Load Regulation	ΔV_{OUT}	1mA ≤ I_{OUT} ≤ 100mA, T_J = 25°C	-	15	54	
		1mA ≤ I_{OUT} ≤ 40mA, T_J = 25°C	-	8	28	
Input Bias Current	I_B	T_J = 25°C	-	1.9	5.0	mA
		T_J = 125°C	-	1.8	4.5	
Input Bias Current Change	ΔI_B	8V ≤ V_{IN} ≤ 20V	-	-	1.3	mA
		1mA ≤ I_{OUT} ≤ 40mA	-	-	0.09	
Output Noise Voltage	e_N	10Hz ≤ f ≤ 100KHz, T_A = 25°C	-	42	-	μV_{RMS}
Ripple Rejection	RR	f = 120Hz, 8V ≤ V_{IN} ≤ 18V, T_J = 25°C	43	64	-	dB
Dropout Voltage	V_D	V_{IN} – V_{OUT}	-	1.7	-	V

1. Value measured in TO-92 package applicable only for DC power dissipation permitted by absolute maximum ratings. Results in die form are dependent on die attach and assembly method.

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