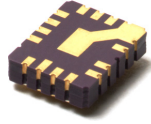


LCC20



LCC4



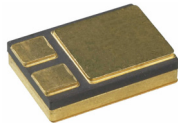
TO-204AA (TO-3)



TO-213AA (TO-66)



SMD05 (TO-276AA)



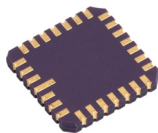
SMD1 (TO-276AB)



TO-257AA



TO-258AA



LCC28

## 1 AMP NEGATIVE LOW DROPOUT REGULATOR FOR STEP DOWN CONVERSION

### FEATURES

- OUTPUT VOLTAGE SPECIFIED OVER TEMPERATURE RANGE
- EXCELLENT LOAD REGULATION
- GUARANTEED 1A OUTPUT CURRENT
- BUILT IN PROTECTION AGAINST EXCESS TEMPERATURE
- SHORT CIRCUIT PROTECTED

The IP2990 is a 1A low dropout negative voltage regulator available with fixed output voltages of -5, -12, and -15V. It is a true low dropout regulator. The dropout voltage at 1A load current is typically 0.6V and a guaranteed worst-case maximum of 1V over the entire operating temperature range.

The regulator is available in a variety of hermetically sealed packages and has the option of being screened to both JAN and Space levels

### ABSOLUTE MAXIMUM RATINGS<sup>1</sup> ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

$V_I$	Maximum Input Supply Voltage	-26V to +0.3V
$V_O$	Nominal Output Voltage (Respective)	-5.0V, -12V & -15V
$I_O$	Output Current	1A
$P_D$	Power Dissipation	Internally Limited
$T_J$	Operating Junction Temperature Range	-40 to +125°C
$T_{STG}$	Storage Temperature	-65 to 150°C

Semelab Plc reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

**Electrical Characteristics IP2990\*-05 (5.0V),** ( $T_J = 25^\circ\text{C}$  unless otherwise stated)

Parameter	Test Conditions	Min	Typ	Max	Units
$V_{OUT}$ Output Voltage	$5\text{mA} \leq I_O \leq 1\text{A}$	-5.25	-5.0	-4.75	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ Line Regulation	$I_O = 5\text{mA}$ $V_{O(NOM)} -1\text{V} > V_{IN} > -26\text{V}$		4	40	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation <sup>1</sup>	$50\text{mA} \leq I_O \leq 1\text{A}$		1	40	
$I_Q$ Quiescent Current	$I_O \leq 1\text{A}$		1	5	mA
	$I_O = 1\text{A}, V_{IN} = V_{O(NOM)}$		9	50	
Short Circuit Current	$R_L = 1\Omega$ (Note 2)	1.5	1.8		A
$I_{O(MAX)}$ Max Output Current	(Note 2)	1.5	1.8		A
Ripple Rejection	$V_{ripple} = 1V_{rms}, f_{ripple} = 1\text{kHz}, I_O = 5\text{mA}$	50	58		dB
$e_n$ Output Noise Voltage	$BW = 10\text{Hz}-100\text{kHz}, I_O = 5\text{mA}$		250	750	$\mu\text{V}$ (rms)
$V_O - V_{IN}$ Dropout Voltage	$I_O = 0.1\text{A}, \Delta V_O \leq 100\text{mA}$		0.1	0.3	V
	$I_O = 1\text{A}, \Delta V_O \leq 100\text{mA}$		0.6	1	
Long term Stability	1000 Hours		2000		ppm

**Electrical Characteristics IP2990\*-12 (12V),** ( $T_J = 25^\circ\text{C}$  unless otherwise stated)

Parameter	Test Conditions	Min	Typ	Max	Units
$V_{OUT}$ Output Voltage	$5\text{mA} \leq I_O \leq 1\text{A}$	-12.60	-12	-11.40	V
$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$ Line Regulation	$I_O = 5\text{mA}$ $V_{O(NOM)} -1\text{V} > V_{IN} > -26\text{V}$		6	60	mV
$\frac{\Delta V_{OUT}}{\Delta I_{OUT}}$ Load Regulation <sup>1</sup>	$50\text{mA} \leq I_O \leq 1\text{A}$		3	50	
$I_Q$ Quiescent Current	$I_O \leq 1\text{A}$		1	5	mA
	$I_O = 1\text{A}, V_{IN} = V_{O(NOM)}$		9	50	
Short Circuit Current	$R_L = 1\Omega$ (Note 2)	0.9	1.2		A
$I_{O(MAX)}$ Max Output Current	(Note 2)	1.4	1.8		A
Ripple Rejection	$V_{ripple} = 1V_{rms}, f_{ripple} = 1\text{kHz}, I_O = 5\text{mA}$	42	52		dB
$e_n$ Output Noise Voltage	$BW = 10\text{Hz}-100\text{kHz}, I_O = 5\text{mA}$		500	1500	$\mu\text{V}$ (rms)
$V_O - V_{IN}$ Dropout Voltage	$I_O = 0.1\text{A}, \Delta V_O \leq 100\text{mA}$		0.1	0.3	V
	$I_O = 1\text{A}, \Delta V_O \leq 100\text{mA}$		0.6	1	
Long term Stability	1000 Hours		2000		ppm

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**Electrical Characteristics IP2990\*-15 (15V), (T<sub>J</sub> = 25°C unless otherwise stated)**

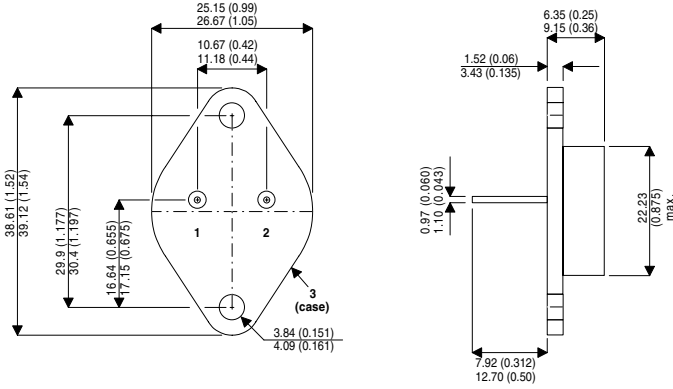
Parameter	Test Conditions	Min	Typ	Max	Units
V <sub>OUT</sub> Output Voltage	5mA ≤ I <sub>O</sub> ≤ 1A	-15.75	-15.0	-14.25	V
ΔV <sub>OUT</sub> / ΔV <sub>IN</sub> Line Regulation	I <sub>O</sub> = 5mA V <sub>O(NOM)</sub> -1V > V <sub>IN</sub> > -26V		6	60	mV
ΔV <sub>OUT</sub> / ΔI <sub>OUT</sub> Load Regulation 1	50mA ≤ I <sub>O</sub> ≤ 1A		3	50	
I <sub>Q</sub> Quiescent Current	I <sub>O</sub> ≤ 1A		1	5	mA
	I <sub>O</sub> = 1A, V <sub>IN</sub> = V <sub>O(NOM)</sub>		9	50	
Short Circuit Current	R <sub>L</sub> = 1Ω (Note 2)	0.75	1		A
I <sub>O(MAX)</sub> Max Output Current	(Note 2)	1.4	1.8		A
Ripple Rejection	V <sub>ripple</sub> = 1V <sub>rms</sub> , f <sub>ripple</sub> = 1kHz, I <sub>O</sub> = 5mA	42	52		dB
e <sub>n</sub> Output Noise Voltage	BW = 10Hz-100kHz, I <sub>O</sub> = 5mA		600	1800	μV (rms)
V <sub>O</sub> -V <sub>IN</sub> Dropout Voltage	I <sub>O</sub> = 0.1A, ΔV <sub>O</sub> ≤ 100mA		0.1	0.3	V
	I <sub>O</sub> = 1A, ΔV <sub>O</sub> ≤ 100mA		0.6	1	
Long term Stability	1000 Hours		2000		ppm

**Power and Thermal Performance**

Parameter	Package Style	Power	Rθ <sub>JC</sub>
Package Power Dissipation <sup>3</sup> And Thermal Resistance (Junction to Case)	TO-204AA (TO-3)	15W	°C/W
	TO-213AA (TO-66)	15W	°C/W
	SMD05 (TO-276AA)	15W	°C/W
	SMD1 (TO-276AB)	15W	°C/W
	TO-257AA	15W	°C/W
	TO-258AA	15W	°C/W
	LCC4	10W	°C/W
	LCC20	10W	°C/W
	LCC28	10W	°C/W

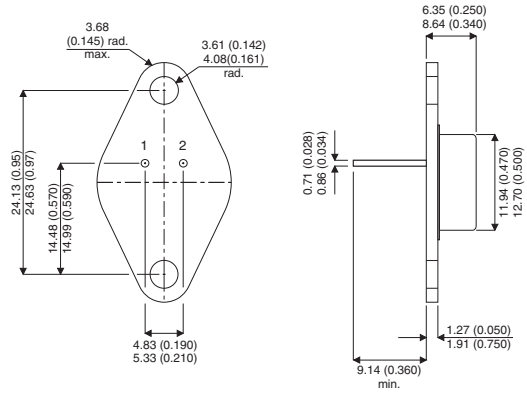
- 1) Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its rated operating conditions.
- 2) Dropout voltage is defined as the input-output differential voltage where the regulator output drops to a value that is 100 mV below the value that is measured at V<sub>IN</sub> = 5V..
- 3) Exceeding the maximum allowable power dissipation will cause excessive die temperature, and the regulator will go into thermal shutdown.

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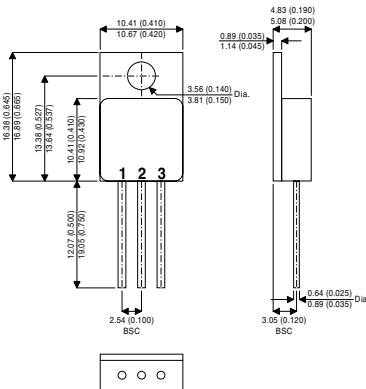
Pin 1 – ADJ  
Pin 2 –  $V_{OUT}$   
Pin 3 –  $V_{IN}$

**K Package –TO-204AA (TO-3)**



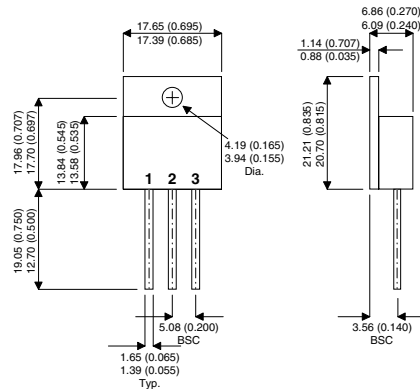
Pin 1 – ADJ  
Pin 2 –  $V_{OUT}$   
Pin 3 –  $V_{IN}$

**R Package –TO-213AA (TO-66)**



Pin 1 – ADJ  
Pin 2 –  $V_{OUT}$   
Pin 3 –  $V_{IN}$

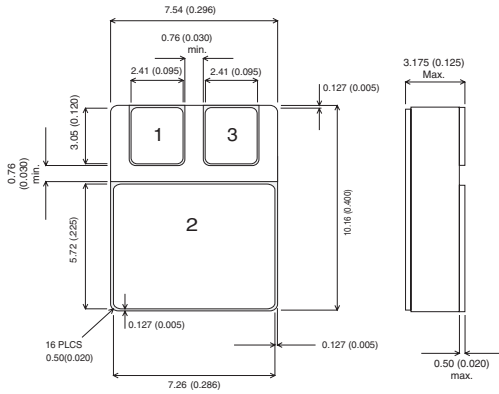
**G/IG Package –TO-257AA (TO-220)**



Pin 1 – ADJ  
Pin 2 –  $V_{OUT}$   
Pin 3 –  $V_{IN}$

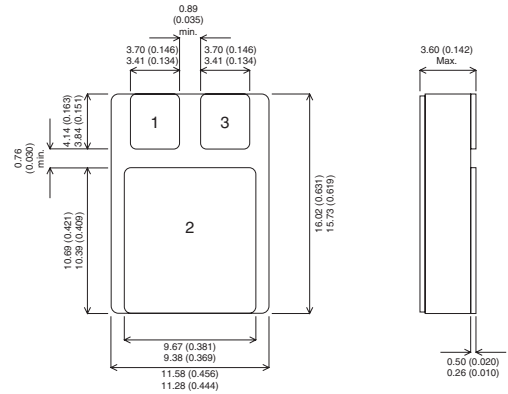
**H Package –TO-258AA**

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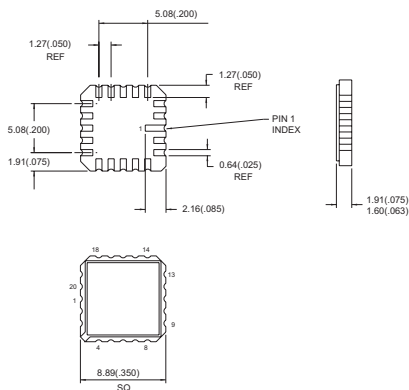
Pin 1 – ADJ  
Pin 2 – V<sub>OUT</sub>  
Pin 3 – V<sub>IN</sub>

Ceramic Surface Mount –SMD05 (TO-276AA)



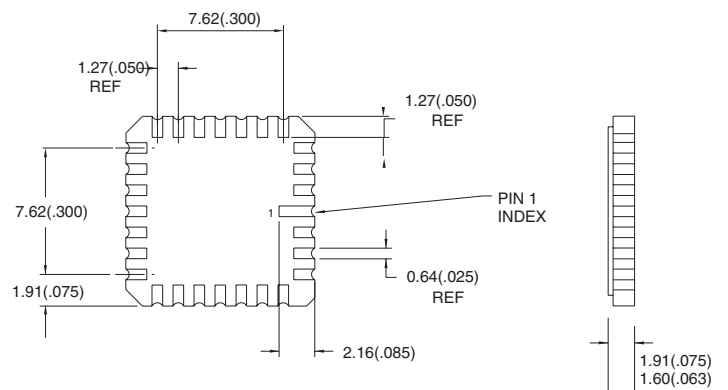
Pin 1 – ADJ  
Pin 2 – V<sub>OUT</sub>  
Pin 3 – V<sub>IN</sub>

Ceramic Surface Mount –SMD1 (TO-276AB)



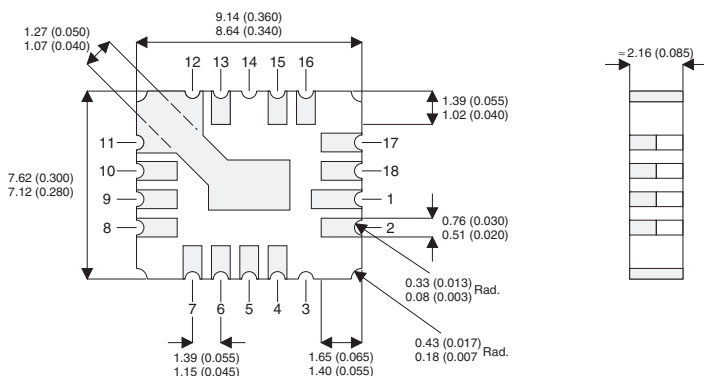
Pin 1 – ADJ  
Pin 2 – V<sub>OUT</sub>  
Pin 3 – V<sub>IN</sub>

LCC20 (Z) Package –Ceramic Surface Mount



Pin 1 – ADJ  
Pin 2 – V<sub>OUT</sub>  
Pin 3 – V<sub>IN</sub>

LCC28 (Y) Package –Ceramic Surface Mount



Pins 4,5 – Adjust  
Pins 6,7,8,9,10,11,12,13 – V<sub>IN</sub>  
Pin 15,16,17,18,1,2 – V<sub>OUT</sub>  
E Package - CERAMIC SURFACE MOUNT

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