

# 1.5 AMP NEGATIVE ADJUSTABLE VOLTAGE REGULATOR APPROVED TO DESC DRAWING 7703403



## Three Terminal, Precision Adjustable Negative Voltage Regulator In Hermetic Style Packages (LM137)

### FEATURES

- Similar To Industry Standard LM137
- Approved To DESC Standardized Military Drawing Number 7703403
- Built In Thermal Overload Protection
- Short Circuit Current Limiting
- Available In Six Package Styles

### DESCRIPTION

These three terminal negative regulators are supplied in hermetically sealed packages. All protective features are designed into the circuit, including thermal shutdown, current-limiting, and safe-area control. With heat sinking, these devices can deliver up to 1.5 amps of output current. The LCC-20 device is limited to .5 amps. The unit also features output voltages that can be fixed from -1.2 volts to -37 volts using external resistors.

### ABSOLUTE MAXIMUM RATINGS $T_c @ 25^\circ\text{C}$

Power Dissipation

Case 2 . . . . .	1.1 W
Case-All Others. . . . .	20 W
Input - Output Voltage Differential . . . . .	40 V
Operating Junction Temperature Range . . . . .	- 55°C to + 150°C
Storage Temperature Range . . . . .	- 65°C to + 150°C
Lead Temperature (Soldering 10 seconds) . . . . .	300°C

Thermal Resistance, Junction to Case:

Case 2, LCC-20 . . . . .	17°C/W
Case U & M, TO-257 (Isol) and SMD-3 . . . . .	4.2°C/W
Case T&N, TO-257 (Non-Isol) and SMD-1 . . . . .	3.5°C/W
Case Y, TO-3 . . . . .	3.0°C/W

Maximum Output Current:

Case 2 . . . . .	.5 A
Case-All Others. . . . .	1.5A

Recommended Operating Conditions:

Output Voltage Range . . . . .	-1.2 to -37 VDC
Ambient Operating Temperature Range ( $T_A$ ) . . . . .	- 55°C to + 125°C
Input Voltage Range . . . . .	-4.25 to -41.25 VDC

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**ELECTRICAL CHARACTERISTICS** -55°C T<sub>A</sub> 125°C, I<sub>L</sub> = 8mA (unless otherwise specified)

**OM1322NTM, OM1322STM, OM1322NKM, OM1322SMM, OM1322NMM**

Parameter	Symbol	Test Conditions	Min.	Max.	Unit
Reference Voltage	V <sub>REF</sub>	V <sub>DIFF</sub>   = 3.0V, T <sub>A</sub> = 25°C  V <sub>DIFF</sub>   = 3.0V  V <sub>DIFF</sub>   = 40V, T <sub>A</sub> = 25°C  V <sub>DIFF</sub>   = 40V	-1.275 -1.30 -1.275 -1.30	-1.225 -1.20 -1.225 -1.20	V
Line Regulation (Note 1)	R <sub>LINE</sub>	3.0 V  V <sub>DIFF</sub>   40V, T <sub>A</sub> = 25°C 3.0 V  V <sub>DIFF</sub>   40V	-9 -23	9 23	mV
Load Regulation (Note 1)	R <sub>LOAD</sub>	V <sub>DIFF</sub>   = 5.0V, 8mA I <sub>L</sub> 1.5A  V <sub>DIFF</sub>   = 12V, 8mA I <sub>L</sub> 1.5A, T <sub>A</sub> = 25°C  V <sub>DIFF</sub>   = 40V, 8mA I <sub>L</sub> 200mA, T <sub>A</sub> = 25°C  V <sub>DIFF</sub>   = 40V, 8mA I <sub>L</sub> 100mA	-25 -25 -25 -25	25 25 25 25	mV
Thermal Regulation	V <sub>RTH</sub>	V <sub>in</sub> = -14.6V, I <sub>L</sub> = 1.5A P <sub>d</sub> = 20 Watts, t = 10 ms, T <sub>A</sub> = 25°C	-5	5	mV
Ripple Rejection (Note 2)	R <sub>N</sub>	f = 120 Hz, V <sub>out</sub> = V <sub>ref</sub> C <sub>Adj</sub> = 10 μF	66		dB
Adjustment Pin Current	I <sub>Adj</sub>	V <sub>DIFF</sub>   = 3.0V  V <sub>DIFF</sub>   = 40V		100 100	μA
Adjustment Pin Current Change	I <sub>Adj</sub> (Line) I <sub>Adj</sub> (Load)	3.0V  V <sub>DIFF</sub>   40V  V <sub>DIFF</sub>   = 5V, 8mA I <sub>L</sub> 1.5A	-5 -5	5 5	μA
Minimum Load Current	I <sub>Lmin</sub>	V <sub>DIFF</sub>   = 3.0V, V <sub>out</sub> = -1.4V (forced)  V <sub>DIFF</sub>   = 10V, V <sub>out</sub> = -1.4V (forced)  V <sub>DIFF</sub>   = 40V, V <sub>out</sub> = -1.4V (forced)		3.0 3.0 5.0	mA
Current Limit (Note 2)	I <sub>CL</sub>	V <sub>DIFF</sub>   5V  V <sub>DIFF</sub>   = 40V, T <sub>A</sub> = 25°C	1.5 0.24	3.5 1.2	A

**Notes:**

1. Load and Line Regulation are specified at a constant junction temperature. Pulse testing with low duty cycle is used. Changes in output voltage due to heating effects must be taken into account separately.
2. If not tested, shall be guaranteed to the specified limits.
3. The • denotes the specifications which apply over the full operating temperature range.

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PART NUMBER DESIGNATOR		
Standard Military Drawing Number	Omnirel Part Number	Omnirel Package Designation
7703403M 7703403U 7703403T 7703403Y 7703403N 7703403Z	OM1322SMM OM1322STM OM1322NTM OM1322 NKM OM1322NMM OM1322N2M	SMD-3 TO-257 (Isolated) TO-257 (non-Isolated) TO-3 SMD-1 LCC-20



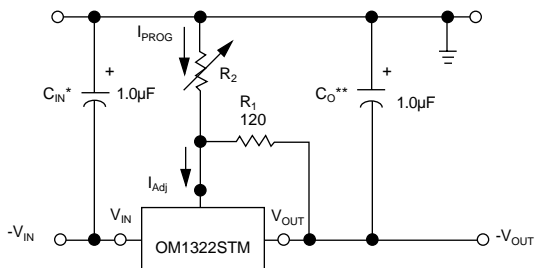
**ELECTRICAL CHARACTERISTICS** -55°C  $T_A$  125°C,  $I_L = 8\text{mA}$  (unless otherwise specified)

**OM1322N2M**

Parameter	Symbol	Test Conditions	Min.	Max.	Unit
Reference Voltage	$V_{REF}$	$ V_{DIFF}  = 3.0\text{V}, T_A = 25^\circ\text{C}$ $ V_{DIFF}  = 3.0\text{V}$ $ V_{DIFF}  = 40\text{V}, T_A = 25^\circ\text{C}$ $ V_{DIFF}  = 40\text{V}$	-1.275 -1.30 -1.275 -1.30	-1.225 -1.20 -1.225 -1.20	V
Line Regulation (Note 1)	$R_{LINE}$	$3.0\text{V }  V_{DIFF}  40\text{V}, T_A = 25^\circ\text{C}$ $3.0\text{V }  V_{DIFF}  40\text{V}$	-9 -23	9 23	mV
Load Regulation (Note 1)	$R_{LOAD}$	$ V_{DIFF}  = 5.0\text{V}, 8\text{mA } I_L 200\text{mA}$ $ V_{DIFF}  = 15\text{V}, 8\text{mA } I_L 200\text{mA}, T_A = 25^\circ\text{C}$ $ V_{DIFF}  = 40\text{V}, 8\text{mA } I_L 150\text{mA}, T_A = 25^\circ\text{C}$ $ V_{DIFF}  = 40\text{V}, 8\text{mA } I_L 50\text{mA}$	-25 -25 -25 -25	25 25 25 25	mV
Thermal Regulation	$V_{RTH}$	$V_{in} = -16.25\text{V}, I_L = 330\text{mA}$ $P_d = 5\text{ Watts}, t = 10\text{ ms}, T_A = 25^\circ\text{C}$	-5	5	mV
Ripple Rejection (Note 2)	$R_N$	$f = 120\text{ Hz}, V_{out} = V_{ref}$ $C_{Adj} = 10\text{ }\mu\text{F}$	66		dB
Adjustment Pin Current	$I_{Adj}$	$ V_{DIFF}  = 3.0\text{V}$ $ V_{DIFF}  = 40\text{V}$		100 100	$\mu\text{A}$
Adjustment Pin Current Change	$I_{Adj}$ (Line) $I_{Adj}$ (Load)	$3.0\text{V }  V_{DIFF}  40\text{V}$ $ V_{DIFF}  = 5\text{V}, 8\text{mA } I_L 500\text{ mA}$	-5 -5	5 5	$\mu\text{A}$
Minimum Load Current	$I_{Lmin}$	$ V_{DIFF}  = 3.0\text{V}, V_{out} = -1.4\text{V (forced)}$ $ V_{DIFF}  = 10\text{V}, V_{out} = -1.4\text{V (forced)}$ $ V_{DIFF}  = 40\text{V}, V_{out} = -1.4\text{V (forced)}$		3.0 3.0 5.0	mA
Current Limit (Note 2)	$I_{CL}$	$ V_{DIFF}  5\text{V}$ $ V_{DIFF}  = 40\text{V}, T_A = 25^\circ\text{C}$	0.5 0.15	1.8 0.65	A

**Notes:**

1. Load and Line Regulation are specified at a constant junction temperature. Pulse testing with low duty cycle is used. Changes in output voltage due to heating effects must be taken into account separately.
2. If not tested, shall be guaranteed to the specified limits.
3. The • denotes the specifications which apply over the full operating temperature range.



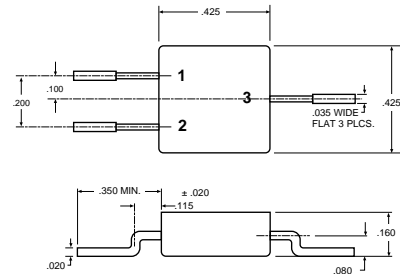
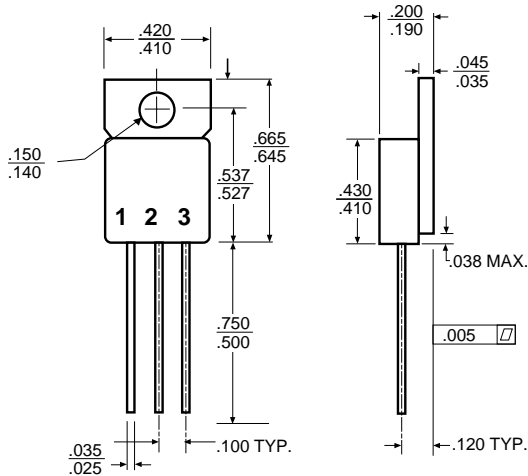
\*  $C_{in}$  is required if regulator is located more than 4 inches from power supply filter. A 1  $\mu\text{F}$  solid tantalum or 10  $\mu\text{F}$  aluminum electrolytic is recommended.

\*\*  $C_o$  is necessary for stability. A 1  $\mu\text{F}$  solid tantalum or 10  $\mu\text{F}$  aluminum electrolytic is recommended.

$$V_{out} = -1.25\text{ V} \left( 1 + \frac{R_2}{R_1} \right)$$

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### MECHANICAL OUTLINE



#### OM1322SMM

Front View  
 Pin 1 - Adjust  
 Pin 2 - Output  
 Pin 3 - Input  
 Case - Isolated

#### OM1322STM

Isolated

Front View

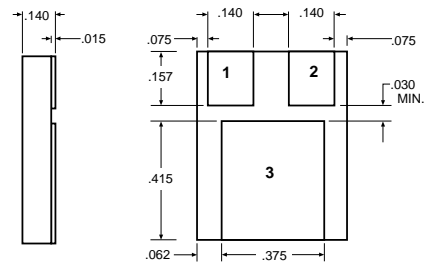
Pin 1 - Adjust  
 Pin 2 - Input  
 Pin 3 - Output  
 Tab - Isolated

#### OM1322NTM

Non-Isolated

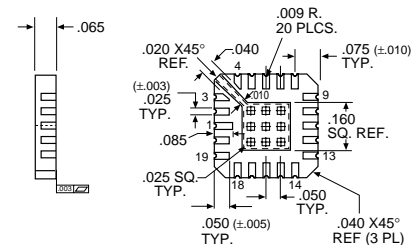
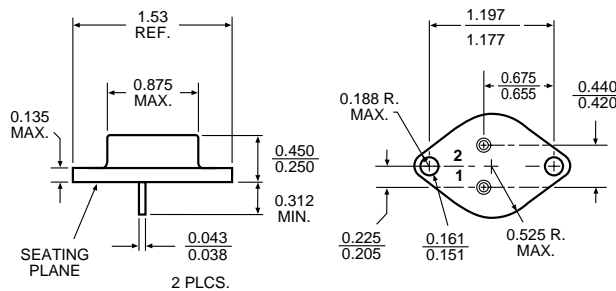
Front View

Pin 1 - Adjust  
 Pin 2 - Input  
 Pin 3 - Output  
 Tab - Input



#### OM1322NMM

Pin 1 - Adjust  
 Pin 2 - Output  
 Pin 3 - Input



#### OM1322N2M

Pin 1	V <sub>OUT</sub>	Pin 11	V <sub>IN</sub>
Pin 2	V <sub>OUT</sub> (Sense)	Pin 12	NC
Pin 3	NC	Pin 13	NC
Pin 4	NC	Pin 14	NC
Pin 5	NC	Pin 15	NC
Pin 6	NC	Pin 16	ADJUST
Pin 7	NC	Pin 17	NC
Pin 8	NC	Pin 18	NC
Pin 9	NC	Pin 19	NC
Pin 10	NC	Pin 20	NC

#### OM1322NKM

Pin 1 - Adjust  
 Pin 2 - Output  
 Case - Input

For additional information please see the mechanical outline section.