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NTE7241 Integrated Circuit, Adjustable Positive 3 Terminal High Voltage Regulator, 1.25V to 125V TO-220 Type Package

Description:

The NTE7241 is an adjustable 3-terminal high-voltage with an output range of 1.2V to 125V and a DMOS output transistor capable of sourcing more than 700 mA. It is designed for use in high-voltage applications where standard bipolar regulators cannot be used. Excellent performance specifications, superior to those of most bipolar regulators, are achieved through circuit design and advanced layout techniques. As a state-of-the-art regulator, the NTE7241 combines standard bipolar circuitry with high-voltage double-diffused MOS transistors on one chip to yield a device capable of withstanding voltages for higher than standard bipolar integrated circuits. Because of its lack of secondary-breakdown and thermal-runaway characteristics usually associated with bipolar outputs, the NTE7241 maintains full overload protection while operating at up to 125V from input to output. Other features of the device include current limiting, safe-operating-area (SOA) protection, and thermal shutdown. Even if ADJ is inadvertently disconnected, the protection circuitry remains functional.

The NTE7241 is characterized for operation over the virtual junction temperature range of 0° to +125°C.

Features:

- Output Adjustable From 1.25V to 125V When Used With an External Resistor Divider
- 700-mA Output Current
- Full Short-Circuit, Safe-Operating-Area, and Thermal-Shutdown Protection
- 0.001%/V Typical Input Voltage Regulation
- 0.15% Typical Output Voltage Regulation
- 76-dB Typical Ripple Rejection

Absolute Maximum Ratings: (Note 1, unless otherwise specified)

Input/Output Voltage Differential, $V_I - V_O$	125V
Operating Free-Air Temperature, T_A	+150°C
Operating Case Temperature, T_C	+150°C
Operating Junction Temperature, T_J	+150°C
Storage Temperature Range, T_{stg}	-65° to +150°C

Note 1. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect reliability.



Absolute Maximum Ratings (Cont'd): (Note 1, unless otherwise specified)

Thermal Resistance, Junction-to-Case (Note 2), R_{thJC} 17°C/W
 Thermal Resistance, Junction-to-Ambient (Note 2), R_{thJA} 19°C/W
 Lead Temperature 1.6mm (1/16 inch) from case for 10 seconds, T_L +260°C

Note 1. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect reliability.

Note 2. Maximum power dissipation is a function of $T_J(max)$, R_{thJA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A/R_{thJA})$. Operating at the absolute maximum T_J of +150°C can affect reliability. Due to variations in individual device electrical characteristics and thermal resistance, the built-in thermal overload protection may be activated at power levels slightly above or below the rated dissipation.

Recommended Operating Conditions:

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input-to Output Voltage Differential	$V_I - V_O$		-	-	125	V
Output Current	I_O		15	-	700	mA
Operating Virtual Junction Temperature	T_J		0	-	125	°C

Electrical Characteristics: ($V_I - V_O = 25V$, $I_O = 0.5A$, $T_J = 0^\circ$ to +125°C 10mA, Note 3, unless otherwise specified)

Parameter	Test Conditions	Min	Typ	Max	Unit	
Input Voltage Regulation	$V_I - V_O = 20V$ to 125V, $P \leq$ Rated Dissipation, (Note 4)	$T_J = +25^\circ C$	-	0.001	0.01	%/V
		$T_J = 0^\circ C$ to +125°C	-	0.004	0.02	%/V
Ripple Rejection	$\Delta V_{I(PP)} = 10V$, $V_O = 10V$, $f = 120Hz$	66	76	-	dB	
Output Voltage Regulation	$I_O = 15$ mA to 700 mA, $T_J = +25^\circ C$	$V_O \leq 5V$	-	7.5	25	mV
		$V_O \leq 5V$	-	0.15%	0.5%	
	$I_O = 15$ mA to 700 mA, $P \leq$ Rated Dissipation	$V_O \leq 5V$	-	20	70	mV
		$V_O \leq 5V$	-	0.3	1.0	%
Output Voltage Change with Temperature		-	0.4%	-	-	
Output Voltage Long-Term Drift	1000 hours at $T_J = +125^\circ C$, $V_I - V_O = 125V$	-	0.2%	-	-	
Output Noise Voltage	$f = 10Hz$ to 10kHz, $T_J = +25^\circ C$	-	0.003%	-	-	
Minimum Output Current to Maintain Regulation	$V_I - V_O = 125V$	-	-	15	mA	
Peak Output Current	$V_I - V_O = 25V$, $t = 1ms$	-	1100	-	mA	
	$V_I - V_O = 15V$, $t = 30ms$	-	715	-	mA	
	$V_I - V_O = 25V$, $t = 30ms$	700	900	-	mA	
	$V_I - V_O = 125V$, $t = 30ms$	100	250	-	mA	
ADJ Input Current		-	83	110	µA	
Change in ADJ Input Current	$V_I - V_O = 15V$ to 125V, $I_O = 15mA$ to 700mA, $P \leq$ Rated Dissipation	-	0.5	5	µA	
Reference Voltage (OUT to ADJ)	$V_I - V_O = 10V$ to 125V, $I_O = 15mA$ to 700mA, $P \leq$ Rated Dissipation, Note 5	1.2	1.27	1.3	V	

Note 3. Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

Note 4. Input voltage regulation is expressed here as the percentage change in output voltage per 1-V change at the input.

Note 5. Due to the dropout voltage and output current-limiting characteristics of this device, output current is limited to less than 700 mA at input-to-output voltage differentials of less than 25V.

