

查询"NJM3524V"供应商 SWITCHING REGULATOR CONTROL CIRCUIT

■ GENERAL DESCRIPTION

The NJM3524 of regulating pulse width modulators contains all of the control circuitry necessary to implement switching regulators of either polarity, transformer coupled DC to DC converters, transformer-less polarity converters and voltage doublers, as well as other power control applications. This device includes a 5V voltage regulator capable of supplying up to 50mA to external circuitry a control amplifier, an oscillator, a pulse width modulator, a phase splitting flip-flop, dual alternating output switch transistors, and current limiting and shut-down circuitry. Both the regulator output transistor and each output switch are internally current limited and, to limit junction temperature, an internal thermal shut-down circuit is employed.

■ FEATURES

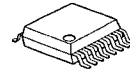
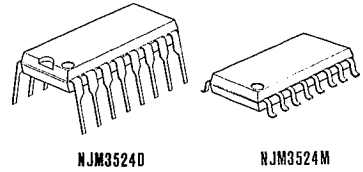
- Operating Voltage (8V~40V)
- Complete PWM Power Control Circuitry
- Uncommitted Outputs for Single-Ended or Push-Pull Applications
- Low Standby Current
- Package Outline
- Bipolar Technology

DIP16, DMP16, SSOP16

■ RECOMMEND OPERATING CONDITION

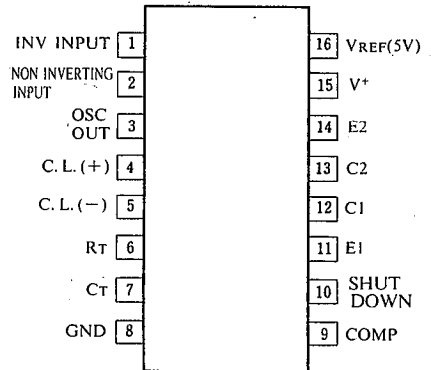
Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Voltage	V ⁺	8	20	40	V
Output Reference Current	I _{REF}	0	—	50	mA
Timing Resistance	R _T	1.8	—	100	kΩ
Timing Capacitor	C _T	—	—	0.1	μF
Operating Temperature Range	T _{opr}	-20	25	75	°C

■ PACKAGE OUTLINE

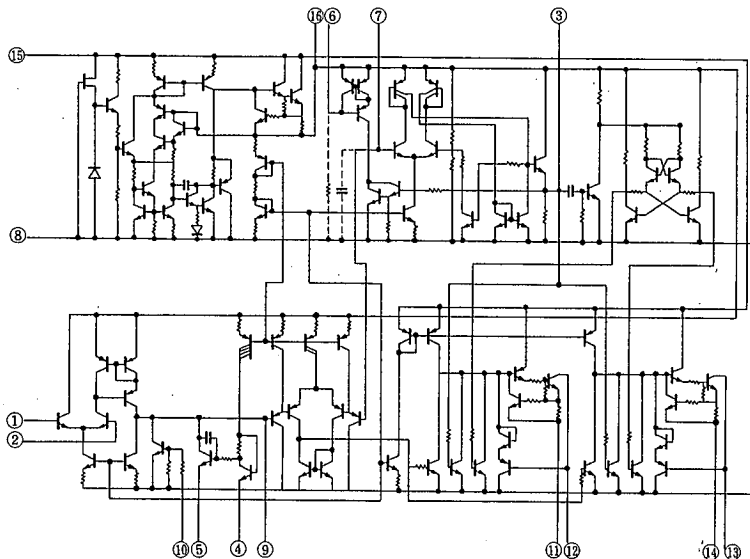


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■ PIN CONFIGURATION



■ EQUIVALENT CIRCUIT



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■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	40	V
Output Current	I _o	100	mA
Output Reference Current	I _{REF}	50	mA
Power Dissipation	P _D	(DIP16) 700	mW
		(DMP16) 300	mW
Operating Temperature Range	T _{opr}	-20~+75	°C
Storage Temperature Range	T _{stg}	-40~+125	°C

■ ELECTRICAL CHARACTERISTICS

 Electrical characteristics over recommended operating free-air temperature range, V⁺=20V, f=20kHz
 (unless otherwise noted).

Reference Section

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V _{REF}	V ⁺ =20V	4.6	5.0	5.4	V
Line Regulation	ΔV _{REF} -V ⁺	V ⁺ =8~40V	—	10	30	mV
Load Regulation	ΔV _{REF} -I _{REF}	V ⁺ =10V, I _{REF} =0~20mA	—	20	50	mV
Ripple Rejection	RR	V ⁺ =20V, f=120Hz	—	66	—	dB
Temperature Coefficient	T.C.	Ta=-20~+75°C	—	-1	—	mV/°C
Short Circuit Output Current	I _{REF S}		—	100	—	mA

Error Amplifier Section

Input Offset Voltage	V _{IO}	V _{IC} =2.5V	—	2	10	mV
Input Bias Current	I _B (1)	V _{IC} =2.5V	—	2	10	μA
Open Loop Voltage Gain	A _V		60	80	—	dB
Input Common Mode Voltage Range	V _{CM}	Ta=25°C	1.8	—	3.4	V
Common Mode Rejection Ratio	CMR		—	70	—	dB
Unity Gain Bandwidth	—		—	3	—	MHz
Output Voltage Swing	—		0.5	—	3.8	V

Oscillator Section

Frequency	f _{osc}	C _T =0.01μF, R _T =2kΩ	—	30	—	kHz
Frequency Change with Voltage	—	V ⁺ =8~40V	—	—	1	%
Frequency Change with Temperature	—	Ta=-20~+75°C	—	—	3	%
Output Pulse Width(Pin 3)	—	C _T =0.01μF	—	0.5	—	μS
Output Amplitude(Pin 3)	—		—	3.5	—	V

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Comparator Section

Maximum Duty Cycle	—	0	—	45	%
Input Threshold (Pin 9)	V_{IH}	"0" duty cycle	—	1.0	V
Input Threshold (Pin 9)	V_{IH}	"Max" duty cycle	—	3.5	V
Input Bias Current	$I_{B(2)}$		—	1	μA

Current Limiting Section

Input Voltage Range	—	-0.7	—	+1.0	V
Sense Voltage	—	180	200	220	mV
Sense Voltage Temperature Coefficient	—	—	0.2	—	mV/°C

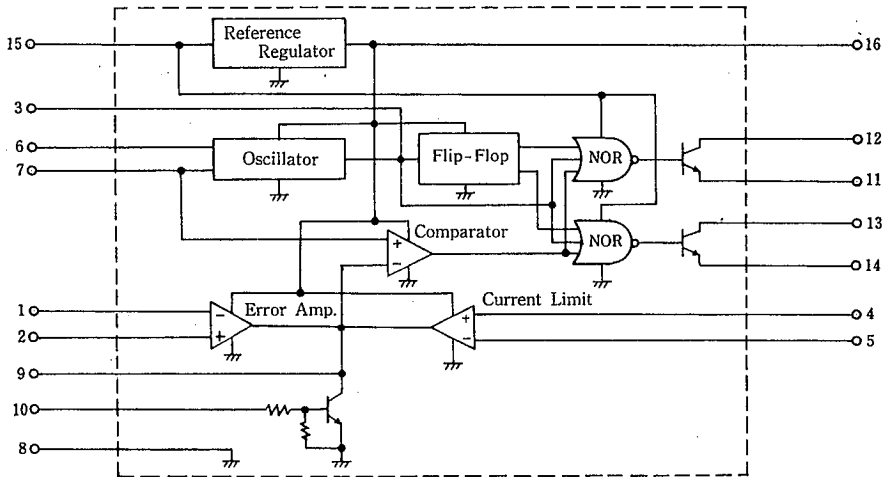
Output Section

Collector-Emitter Breakdown Voltage	V_{CER}	40	—	—	V
Collector Leakage Current	I_{CER}	—	0.1	50	μA
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	1	2	V
Emitter Output Voltage	—	17	18	—	V
Turn-off Voltage Rise Time	T_r	—	0.2	—	μS
Turn-on Voltage Fall Time	T_f	—	0.1	—	μS

Total Device

Standby Current	I_O	$V^+ = 40V, Pin_{(2)} = 2V$ 1,4,7,8,9,11,14=GND All Other Inputs and Outputs Open	—	8	10	mA
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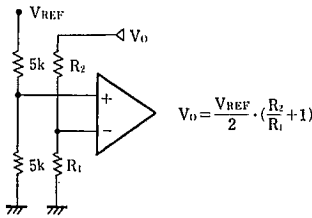
■ BLOCK DIAGRAM



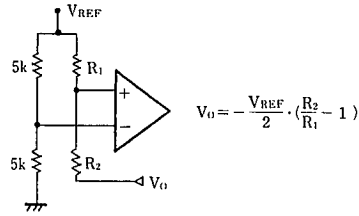
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■ ERROR AMPLIFIER BIAS CIRCUITS

(A) Positive Output

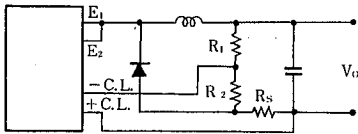


(B) Negative Output



■ CURRENT LIMIT

- (a) Take the detection output from the ground line side, because the input voltage range is $-0.7V \sim +1.0V$.
- (b) The sensing voltage is 200mV typical.

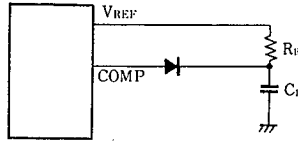


$$I_{O(MAX)} = \frac{1}{R_S} (V_{SENSE} + \frac{R_2}{R_1 + R_2} V_0)$$

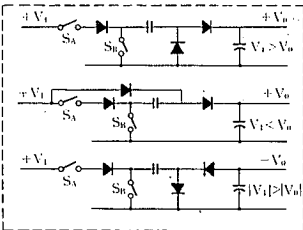
$$I_{O(S)} = \frac{V_{SENSE}}{R_S}$$

■ SOFT START METHOD

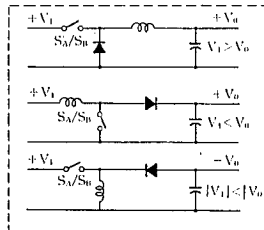
It is possible that the output stage is broken due to a wrong operation of circuits simultaneously when supply voltage was applied. This failure can be prevented by setting the error amplifier output to a low level for a certain time as shown in the right figure. In this case, the soft start time is determined by the time constant of R_B and C_B .



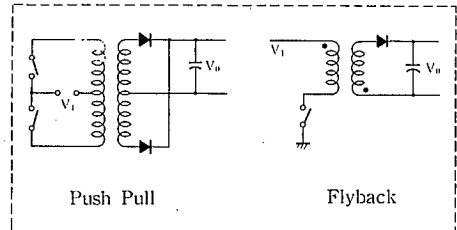
■ OUTPUT CONFIGURATIONS



Capacitor-Diode-Coupled Voltage Multiplier Output stage



Single-Ended Inductor Circuit



Push Pull
Flyback
Transformer-Coupled Outputs

■ TYPICAL APPLICATIONS

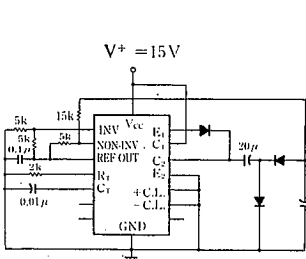


Fig. 1 Capacitor-Diode Output Circuit

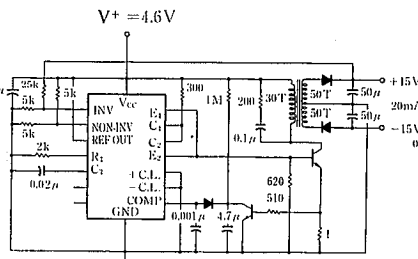


Fig. 2 Flyback Converter Circuit

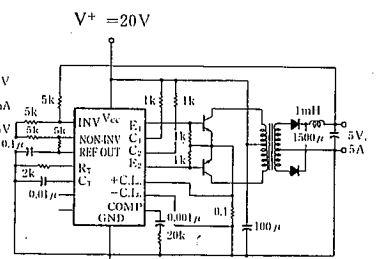
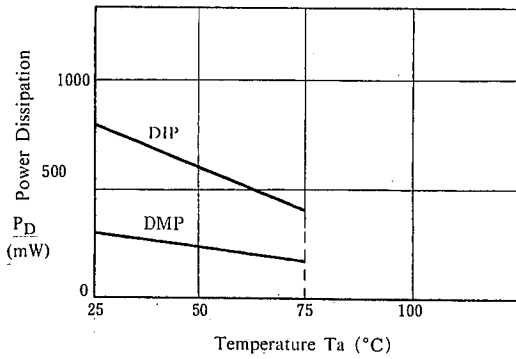


Fig. 3 Push-Pull Transformer-Coupled Circuit

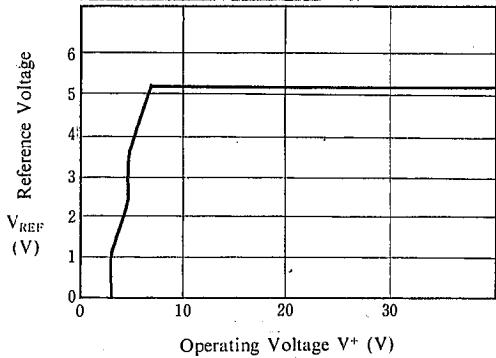
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POWER DISSIPATION VS. AMBIENT TEMPERATURE

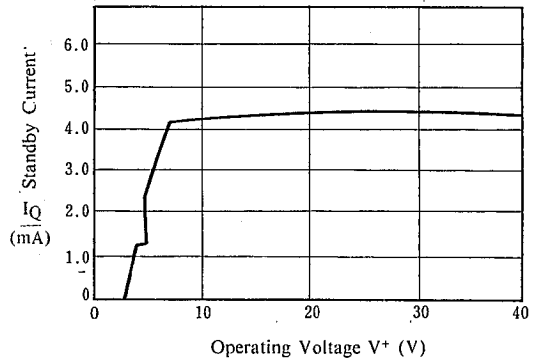


TYPICAL CHARACTERISTICS

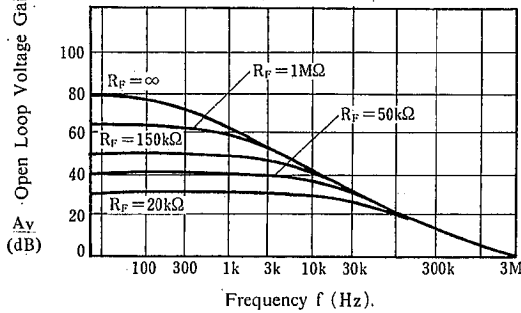
Reference Voltage vs. Operating Voltage



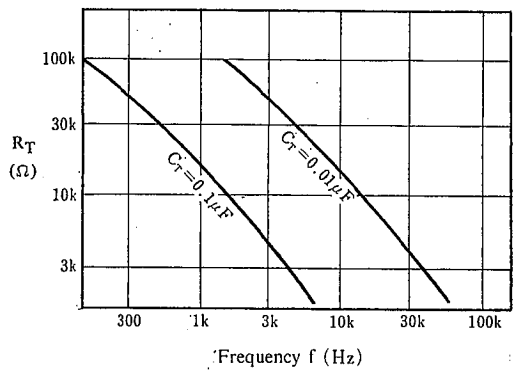
Standby Current vs. Operating Voltage



Open Loop Voltage Gain vs. Frequency



R_T, C_T vs. Frequency



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MEMO

[CAUTION]

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