

Micropower Supervisory Circuit With Manual Reset

General Description

The LN3526 are microprocessor reset circuits, which are ideal for monitoring voltage supplies in portable systems, where battery life extended is critical. They provide a reliable, low-cost solution by eliminating external components. When the input voltage drops below a fixed threshold, the device asserts a reset signal for a minimum of 150ms after VCC has risen back above the fixed threshold. They are guaranteed to operate down to 1.2V and designed to ignore fast line transients appearing on VCC.

The LN3526 series is available with three output stage versions: push-pull active low output; push-pull active high output; and open drain active low output. The quiescent supply current is extremely low, typically 1 μ A, making this device ideal for portable battery operated equipment. LN3526 devices are available in a Pb-free, 4-pin SOT143 package and are specified over the -40°C to +85°C operating temperature range.

Features

- Highly Accurate: $\pm 2\%$
- Low Power Consumption : lower than 1.5 μ A
- Detect Voltage Range: 1.5V ~ 5.0V in 0.1V increments
- Operating Voltage Range: 0.7V ~ 7.0V
- Detect Voltage Temperature Characteristics: $\pm 100\text{ppm}/^\circ\text{C}$ (TYP.)
- Built-In Delay Circuit:
The option item include: 50ms, 100ms, 200ms, 400ms
- Output Configuration: N-channel open drain or CMOS

Applications

- Microprocessor reset circuitry
- Memory battery back-up circuits
- Power-on reset circuits
- Power failure detection
- System battery life and charge voltage monitors
- Delay circuitry

Package

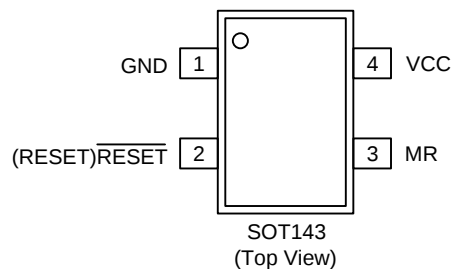
- SOT-143

Ordering Information

LN3526 ①②③④⑤⑥⑦

Designator	Description	Symbol	Description
①	Output Configuration	C	CMOS output
		N	N-ch open drain output
② ③	Detect Voltage	15~50	e.g. 2.5V $\rightarrow$ ② 2 , ③ 5
			e.g. 3.8V $\rightarrow$ ② 3, ③ 8
④	Output Delay	1	70ms ~ 150ms
		2	330ms ~ 500ms
		4	150ms ~ 270ms
		5	30ms ~ 80ms
⑤	Detect Accuracy	2	Within $\pm 2.0\%$
⑥	Package	M	SOT-143
⑦	Device Orientation	R	Embossed tape, standard feed
		L	Embossed tape, reverse feed

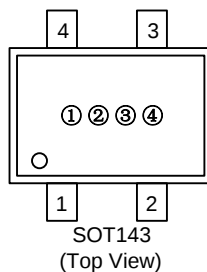
Pin Configurations



Pin Number	Pin Name	Function
SOT-23		
1	GND	Ground
2	RESET	Output
3	MR	Manuel reset
4	VCC	Input supply

Marking Rule

SOT-143



① Represents integer of detect voltage and output configuration

CMOS output (LN3526C series)

Mark	Configuration	Voltage(V)
a	CMOS	0.X
b	CMOS	1.X
c	CMOS	2.X
d	CMOS	3.X
e	CMOS	4.X
f	CMOS	5.X

N open drain (LN3526N series)

Mark	Configuration	Voltage(V)
0	N-ch	0.X
1	N-ch	1.X
2	N-ch	2.X
3	N-ch	3.X
4	N-ch	4.X
5	N-ch	5.X

② Represents decimal number of detect voltage

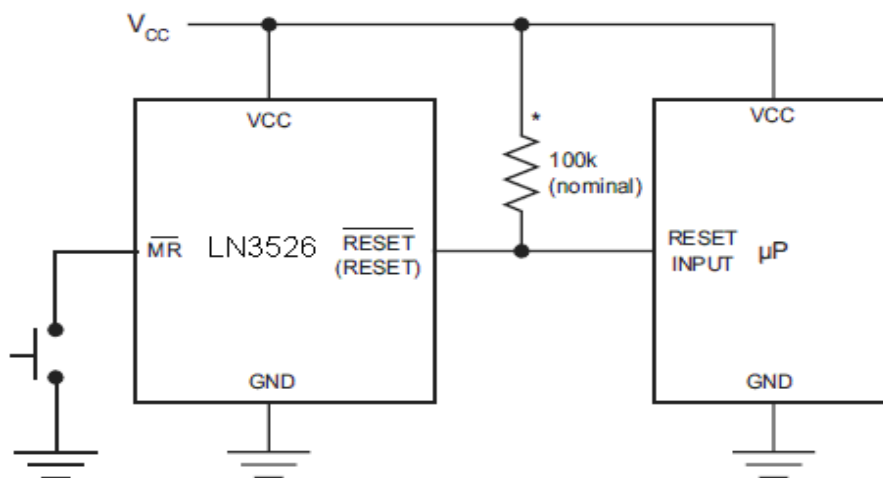
Mark	Voltage(V)	Mark	Voltage(V)
0	X.0	5	X.5
1	X.1	6	X.6
2	X.2	7	X.7
3	X.3	8	X.8
4	X.4	9	X.9

③ Represents delay time

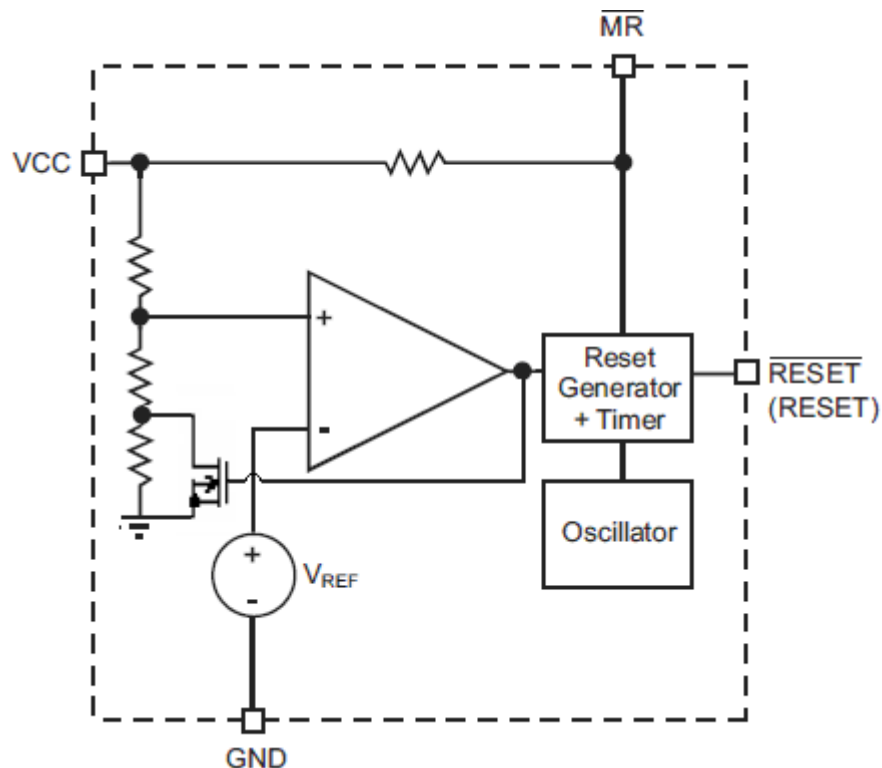
Mark	Delay Time
5	70ms ~ 150ms
6	330ms ~ 500ms
7	30ms ~ 80ms
8	150ms ~ 270ms

④ Represents assembly lot number (Based on internal standards)

■ Typical Application Circuit



■ Function Block Diagram



■ Absolute Maximum Ratings

Ta=25℃

Parameter		Symbol	Maximum Rating	Unit
Input supply voltage		V _{CC}	-0.3 to 5.5	V
MR input voltage		V _{MR}	-0.3 to V _{CC} +0.3	V
Output voltage	CMOS	V _{RESET}	-0.3 to V _{CC} + 0.3	V
	NMOS open drain		-0.3 to 5.5	
Maximum Continuous Input Current		I _{VCC} , I _{MR}	20	mA
RESET/RESET Current		I _{RESET}	20	mA
Rate of Rise of VCC		dV _{CC} /dt	100	V/us
Operating Junction Temperature Range		T _{opr}	-40~+150	℃
Maximum Soldering Temperature (at Leads) for 10s		T _{stg}	300	℃
Maximum Thermal Resistance		θ _{JA}	200	℃/W
Maximum Power Dissipation		P _D	320	mW

Electrical Characteristics

Ta=25°C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Power supply	V _{CC}	T _A = 0°C to +70°C	1.0		5.5	V
		T _A = -40°C to +85°C	1.2		5.5	
Detect Voltage	V _{DF}	T _A = 25°C	V _{DF} - 2%	V _{DF}	V _{DF} + 2%	V
		T _A = -40°C to +85°C	V _{DF} - 2.5%	V _{DF}	V _{DF} + 2.5%	
Hysteresis Range	V _{HYS}		V _{DF} × 0.02	V _{DF} × 0.05	V _{DF} × 0.08	V
RESET Threshold Tempco	ΔVDF/°C			100		ppm/°C
RESET Propagation Delay	t _p	V _{CC} = V _{DF} to (V _{DF} - 100mV)		15		μs
RESET Active Timeout Period	t _{RDY}	LN3526***1***	70		150	ms
		LN3526***2***	330		500	
		LN3526***4***	150		270	
		LN3526***5***	30		80	
MR Minimum Pulse Width	t _{MR}		10			μs
MR Glitch Immunity	MRGI			100		ns
MR to Reset Propagation Delay	t _{MD}			0.5		μs
MR Input Threshold (High)	VIH	V _{CC} = V _{DF(MAX)} , V _{DF} ≥ 4.38V	2.3			V
		V _{CC} = V _{DF(MAX)} , V _{DF} < 4.38V	0.7V _{CC}			
MR Input Threshold (Low)	VIL	V _{CC} = V _{DF(MAX)} , V _{DF} ≤ 4.38V			0.8	V
		V _{CC} = V _{DF(MAX)} , V _{DF} < 4.38V			0.25V _{CC}	
MR Pull-Up Resistance	R _{MR}		30	65	90	kΩ
Quiescent Current	I _{SS}	VIN = 1.5V		1.2	2.0	μA
		VIN = 2.0V		1.3	2.5	
		VIN = 3.0V		1.3	3.0	
		VIN = 4.0V		1.4	3.5	
		VIN = 5.0V		1.6	4	
Output current	I _{OUT}	N-ch V _{DF} = 0.5V	VIN = 1.5V	2		mA
			VIN = 2.0V	7		
			VIN = 3.0V	10		
			VIN = 4.0V	11		
			VIN = 5.0V	13		
		CMOS, P-ch V _{DF} =2.1V VIN = 8.0V		-10		
RESET Leakage Current,	I _{DOFF}	V _{CC} > V _{DF}			1	μA

V_{DF(T)}: Setting detect voltage value

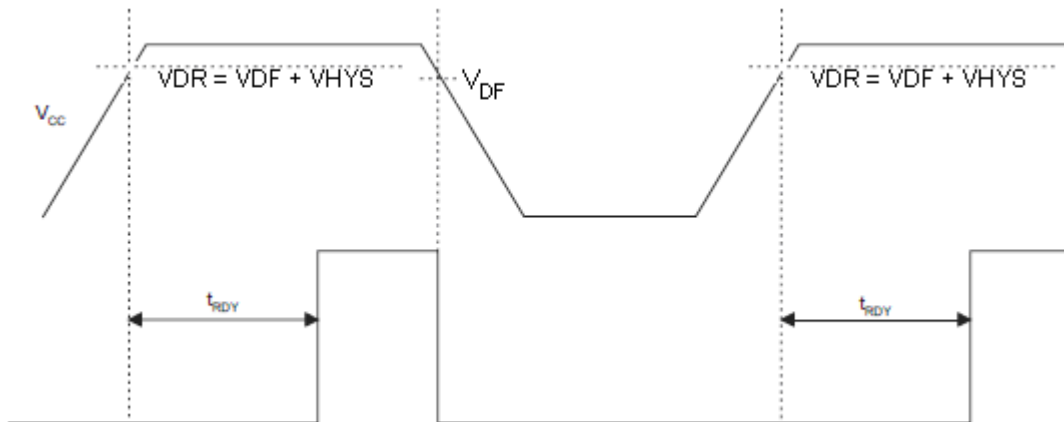
Release Voltage: VDR = VDF + VHYS

* Transient Delay Time: 1ms to 50ms & 80ms to 400ms versions are also available.

Note: The power consumption during power-start to output being stable (release operation) is 2μA greater than it is after that period (completion of release operation) because of delay circuit through current.

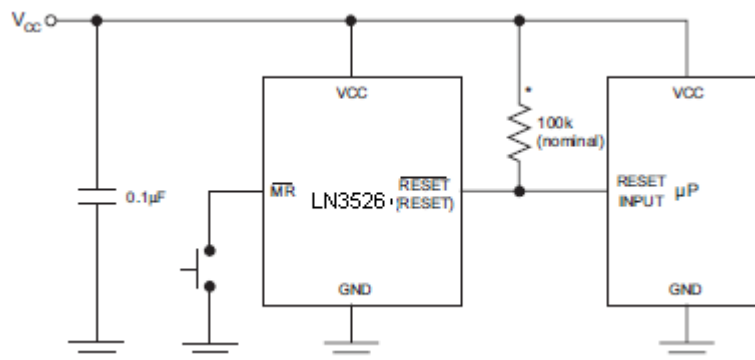
Operational Explanation

When the input voltage drops below a fixed threshold, the device asserts a reset signal for a minimum of 200ms after VCC has risen back above the fixed threshold, if the input voltage wouldn't drops again.

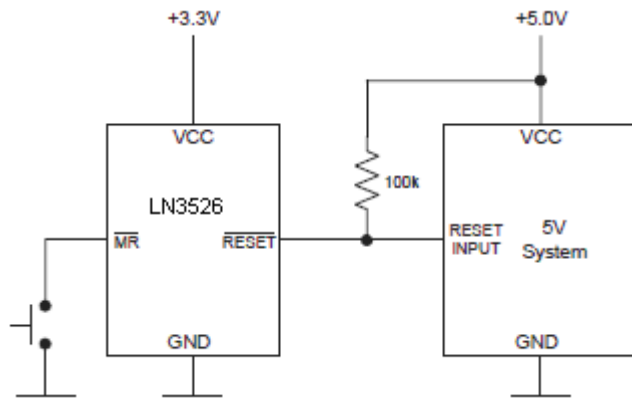


Directions For Use

- The bypass capacitor is recommended to make the supply more stable:

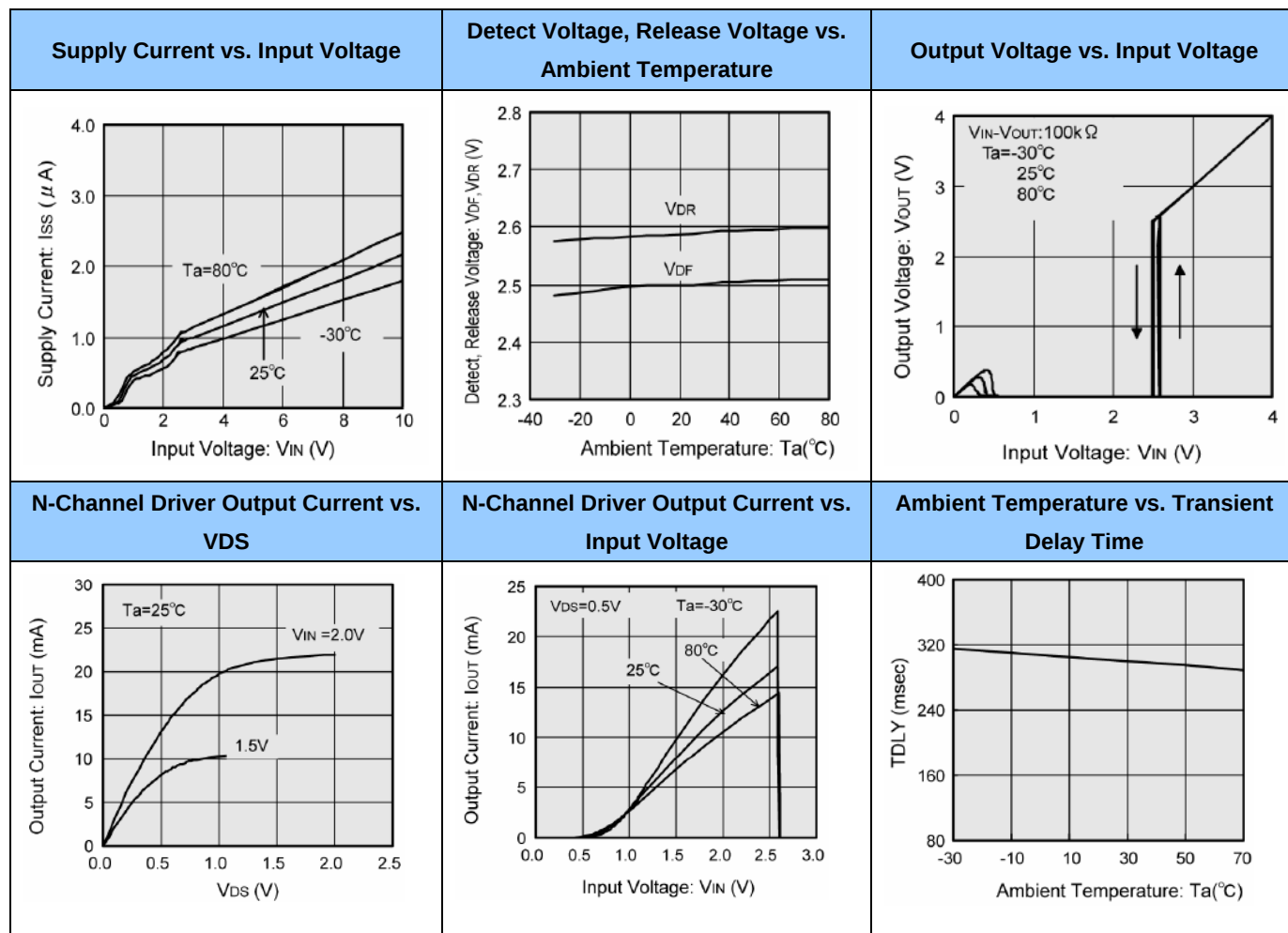


- The reset can pull up to a different power supply from input in the N open drain output stage versions.



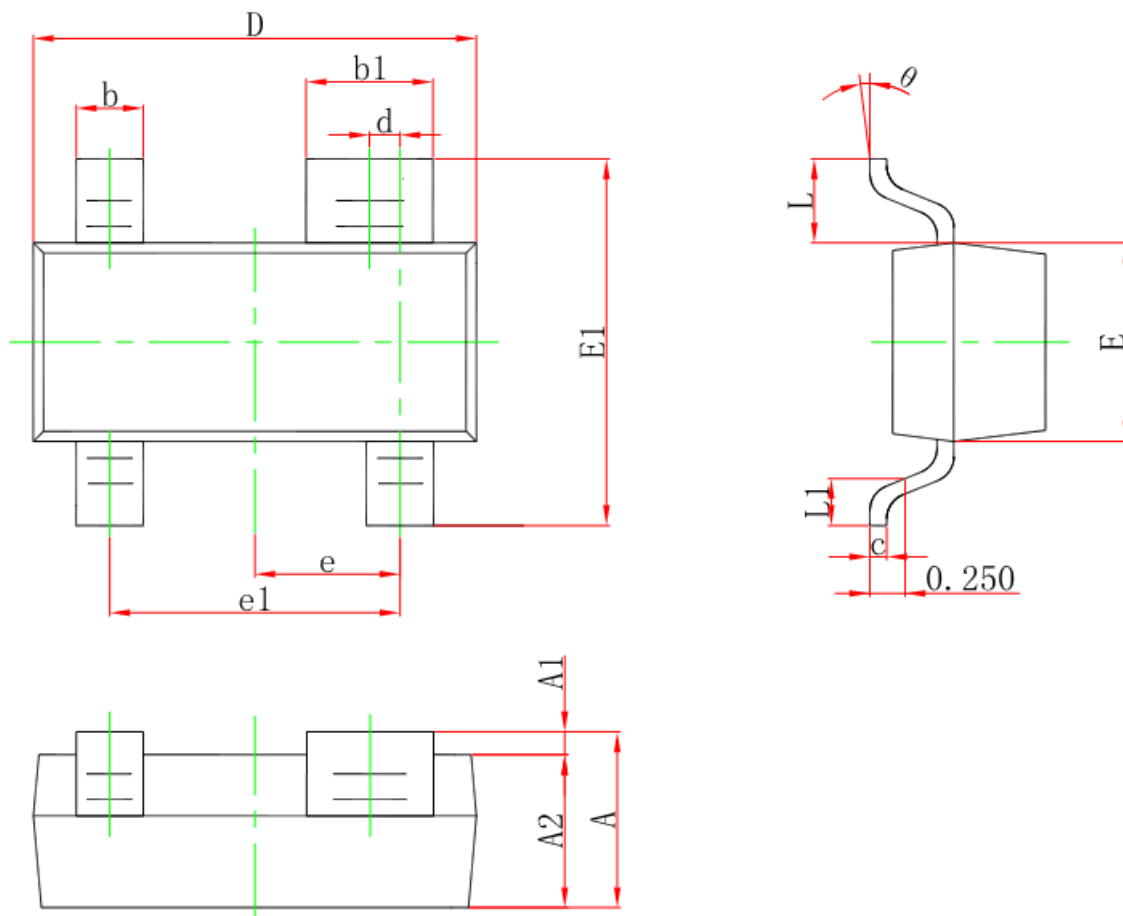
Typical Performance Characteristics

Product for Test: $V_{DF}=2.5V$



■ Package Information

- SOT-143



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
b1	0.750	0.900	0.030	0.035
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
d	0.200 TYP.		0.008 TYP.	
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°