NLHV1T0434

48 V RF Antenna Switch Driver

The NLHV1T0434 MiniGate™ is an advanced high−voltage CMOS RF Antenna Switch Driver in ultra−small footprint.

Features

- Single Channel/High−Drive
- High−Speed/Low−Power
- Wide Operating V_{DD} Range: 3.0 V to 5.5 V
- Wide Output V_{CC} Range: 16 V to 50 V
- Low R_{DSon}:
  NMOS = 10 Ω Max
  PMOS = 200 Ω Max
- High output DC current: $I_{OL} \geq 130$ mA
- Max input frequency: 2 MHz minimum
- Low Static Current: I_{DDmax}, I_{CCmax} = 100 μA
- Low Dynamic Current @ 100 kHz:
  $I_{DDdynmax}$ = 0.2 mA, $I_{CCdynmax}$ = 1.0 mA
- Available in MSOP8−EP
- These Devices are Pb−Free, Halogen−Free/BFR−Free and are RoHS−Compliant

ON Semiconductor®

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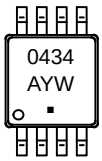
MSOP−8
Z SUFFIX
CASE 846AM

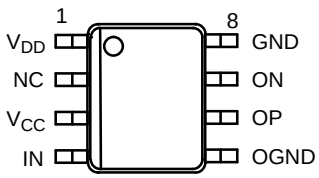
MARKING DIAGRAM



0434 = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

PIN CONNECTIONS



(Top View)

ORDERING INFORMATION

Device	Package	Shipping†
NLHV1T0434ZR2G	MSOP8−EP (Pb−Free)	3000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

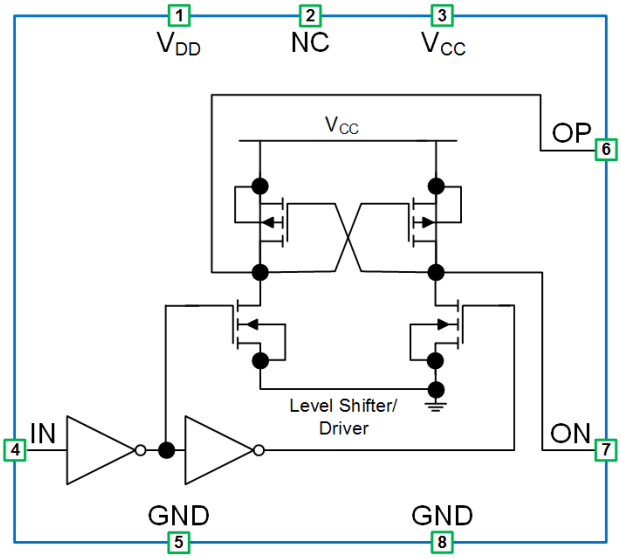


Figure 1. Block Diagram

Table 1. PIN ASSIGNMENT

Pin	Pin Name	Description
1	V_{DD}	Digital Power Supply
2	NC	No Connect
3	V_{CC}	High Voltage Supply
4	IN	Input
5	GND	Ground
6	OP	Non−Inverted Output
7	ON	Inverted Output
8	GND	Ground

Table 2. FUNCTION TABLE

Input	Output	
A	**OP**	**ON**
L	L	H
H	H	L

Table 3. MAXIMUM RATINGS

Symbol	Parameter		Value	Unit
V_{DD}	Digital Supply Voltage		−0.5 to +7.0	V
V_{CC}	High−Voltage Supply Voltage		−0.5 to +55.0	V
V_{IN}	DC Input Voltage		−0.5 to +7.0	V
V_{OUT}	DC Output Voltage		−0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	V_{IN} < GND	−20	mA
I_{OK}	DC Output Diode Current	V_{OUT} > V_{CC}, V_{OUT} < GND	±200	mA
I_O	DC Output Source/Sink Current		±200	mA
I_{CC}	DC Supply Current Per Supply Pin		±200	mA
I_{GND}	DC Ground Current per Ground Pin		±200	mA
T_{STG}	Storage Temperature Range		−65 to +150	°C
T_L	Lead Temperature, 1 mm from Case for 10 Seconds		260	°C
T_J	Junction Temperature Under Bias		150	°C
MSL	Moisture Sensitivity		Level 1	
F_R	Flammability Rating	Oxygen Index: 28 to 34	UL 94 V−0 @ 0.125 in	
V_{ESD}	ESD Withstand Voltage	Human Body Mode (Note 2) Charged Device Model (Note 3)	> 4 > 2	kV
$I_{LATCHUP}$	Latchup Performance Above V_{CC} and Below GND at 125°C	(Note 4)	±100	mA
SR_{VCC}	Minimum V_{CC} Rise Rate	(Note 5)	5	μs/V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Measured with minimum pad spacing on an FR4 board, using 10 mm−by−1 inch, 2 ounce copper trace no air flow.
2. Tested to EIA / JESD22−A114−A.
3. Tested to JESD22−C101−A.
4. Tested to EIA / JESD78.
5. A faster V_{CC} rise rate could damage the output of the device.

Table 4. RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{DD}	Digital Supply Voltage	3.0	5.5	V
V_{CC}	High Voltage Supply Voltage	16	50	V
V_{IN}	Digital Input Voltage	0	5.5	V
V_{OUT}	Output Voltage	0	V_{CC}	V
T_A	Operating Free−Air Temperature	−55	+125	°C
$\Delta t / \Delta V$	Input Transition Rise or Fail Rate	0	20	nS/V

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Table 5. DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	V_{DD} (V)	V_{CC} (V)	T_A = 25°C			T_A = −55°C to +125°C		Unit
					Min	Typ	Max	Min	Max	
V_{IH}	High−Level Input Voltage		3.0 to 5.5	16 to 50	1.7	−	−	1.7	−	V
V_{IL}	Low−Level Input Voltage		3.0 to 5.5	16 to 50	−	−	0.4	−	0.4	V
V_{OH}	High−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}, I_{OH} = −100 μA	3.0 to 5.5	16 to 50	V_{CC} −0.5	V_{CC}		V_{CC} −0.5		V
V_{OL}	Low−Level Output Voltage	V_{IN} = V_{IH} or V_{IL}, I_{OL} = 10 mA	3.0 to 5.5	16 to 50	−	0.04	0.2	GND	0.2	V
I_{IN}	Input Leakage Current	V_{IN} = 0 to 5.5 V	3.0 to 5.5	16 to 50	−	−	±10	−	±10	μA
I_{DD}	Quiescent Supply Current	V_{IN} = V_{DD} or GND	3.0 to 5.5	16 to 50	−	50	100	−	100	μA
I_{CC}	Quiescent Supply Current	V_{IN} = V_{DD} or GND	3.0 to 5.5	16 to 50	−	50	100	−	100	μA
R_{ONN}	Output NMOS ON Resistance	I_{OL} = 130 mA	3.0 to 5.5	16 to 50	−	4	10	−	10	Ω
$R_{ONNFLAT}$	Output NMOS ON Resistance Flatness	I_{OL} = 130 mA	3.0 to 5.5	16 to 50	−	0.4	2	−	3	Ω
R_{ONP}	Output PMOS ON Resistance	I_{OH} = −100 μA	3.0 to 5.5	16 to 50	−	60	200	−	200	Ω

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

Table 6. AC ELECTRICAL CHARACTERISTICS (Input $t_r = t_f = 3.0$ nS)

Symbol	Parameter	Test Condition	V_{DD} (V)	V_{CC} (V)	T_A = 25°C			T_A = −55°C to +125°C		Unit
					Min	Typ	Max	Min	Max	
t_{PHL}	High to Low Propagation Delay, IN to OP, ON	C_L = 1 nF	3.0 to 5.5	50	−	38	100	−	100	ns
				48	−	38	100	−	100	
				28	−	31	100	−	100	
				18	−	28	100	−	100	
		C_L = 10 pF	3.0 to 5.5	50	−	21	80	−	80	
				48	−	21	80	−	80	
				28	−	21	80	−	80	
				18	−	20	80	−	80	
t_{PLH}	Low to High Propagation Delay, IN to OP, ON	C_L = 1 nF	3.0 to 5.5	50	−	159	400	−	400	ns
				48	−	159	400	−	400	
				28	−	95	400	−	400	
				18	−	69	400	−	400	
		C_L = 10 pF	3.0 to 5.5	50	−	16	60	−	60	
				48	−	16	60	−	60	
				28	−	13	60	−	60	
				18	−	12	60	−	60	
t_F	Output Fall Time	C_L = 1 nF	3.0 to 5.5	50	−	28.5	100	−	100	ns
				48	−	28.5	100	−	100	
				28	−	19.3	100	−	100	
				18	−	14.5	100	−	100	
		C_L = 10 pF	3.0 to 5.5	50	−	4.1	50	−	50	
				48	−	4.1	50	−	50	
				28	−	3.0	50	−	50	
				18	−	2.1	50	−	50	
t_R	Output Rise Time	C_L = 1 nF	3.0 to 5.5	50	−	285.7	1000	−	1000	ns
				48	−	285.7	1000	−	1000	
				28	−	182.6	1000	−	1000	
				18	−	144.4	1000	−	1000	
		C_L = 10 pF	3.0 to 5.5	50	−	8.6	50	−	50	
				48	−	8.6	50	−	50	
				28	−	5.1	50	−	50	
				18	−	4.4	50	−	50	
I_{DD-DYN}	Dynamic Current at V_{DD}	f = 100 kHz; ON, OP open	3.0 to 5.5	16 to 50		0.1	0.2		0.2	mA
I_{CC-DYN}	Dynamic Current at V_{CC}	f = 100 kHz; ON, OP open	3.0 to 5.5	16 to 50		0.5	1.0		1.0	mA
f	Maximum Input Frequency	ON, OP open	3.0 to 5.5	16 to 50	2			2		MHz

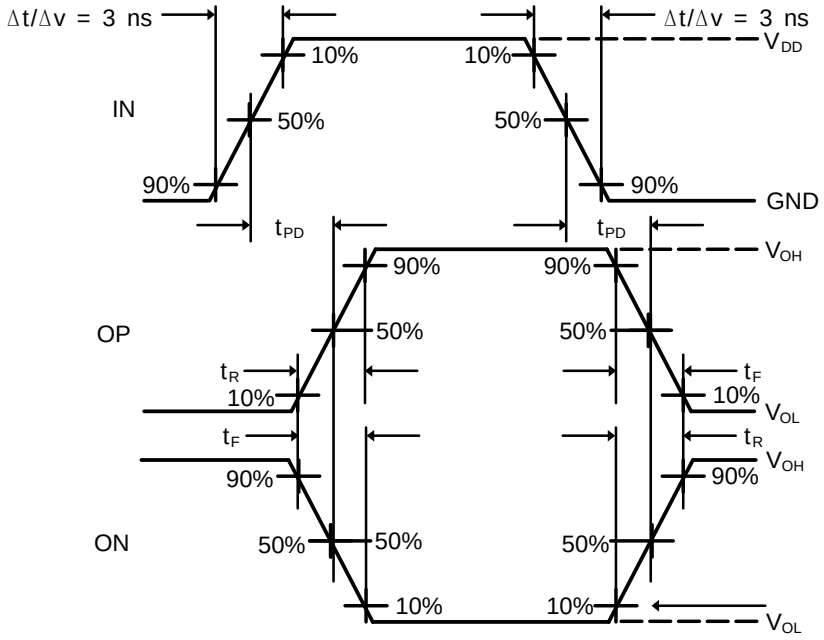


Figure 2. Switching Waveforms

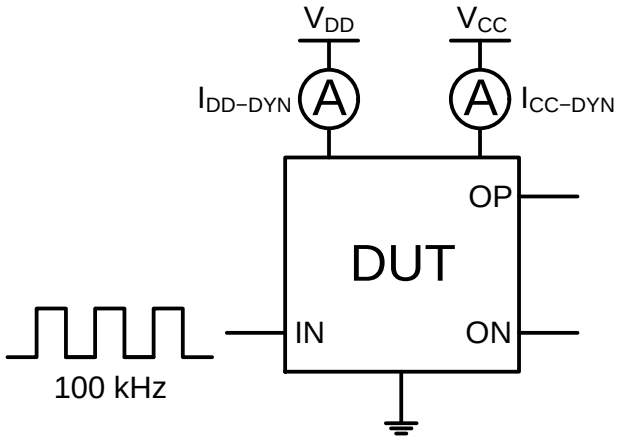
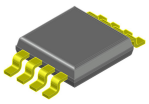
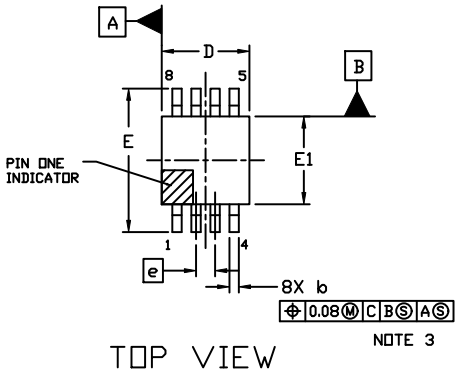


Figure 3. Test Set−up for Dynamic Current

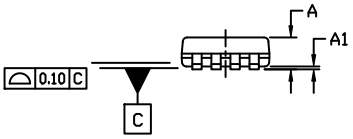


MSOP8 EP, 3x3
CASE 846AM
ISSUE B

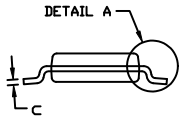
DATE 07 JAN 2022



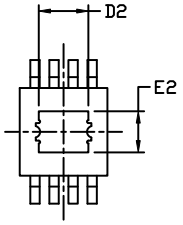
TOP VIEW



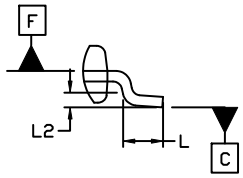
SIDE VIEW



END VIEW



BOTTOM VIEW

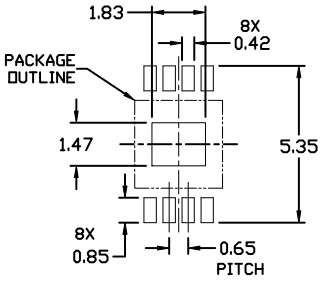


DETAIL A

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.10 mm IN EXCESS OF MAXIMUM MATERIAL CONDITION.
4. DIMENSION D DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 mm PER SIDE. DIMENSION E DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 mm PER SIDE. DIMENSIONS D AND E ARE DETERMINED AT DATUM F.
5. DATUMS A AND B ARE TO BE DETERMINED AT DATUM F.
6. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.

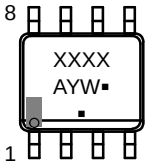
	MILLIMETERS	
DIM	MIN.	MAX.
A	---	1.10
A1	0.05	0.15
b	0.25	0.40
c	0.13	0.23
D	2.90	3.10
D2	1.73	1.83
E	4.75	5.05
E1	2.90	3.10
E2	1.37	1.47
e	0.65 BSC	
L	0.40	0.70
L2	0.254 BSC	



RECOMMENDED MOUNTING FOOTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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