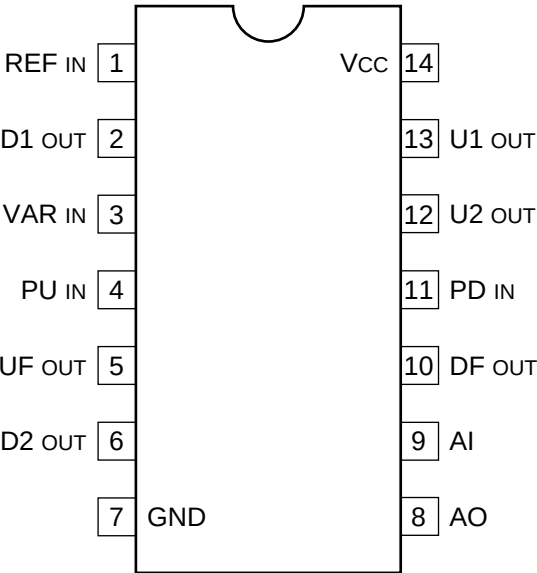


PHASE-FREQUENCY DETECTOR

—TOP VIEW—



INPUT

AI : FILTER AMP
PD : CHARGE PUMP DOWN
PU : CHARGE PUMP UP
REF : REFERENCE
VAR : VARIABLE

OUTPUT

AO : FILTER AMP
D1, D2 : DOWN
DF : CHARGE PUMP DOWN
U1, U2 : UP
UF : CHARGE PUMP UP

PHASE FREQ. DET-1
FALLING EDGE SENSING TYPE

INPUTS	OUTPUTS	
	U1	D1
$f_V = f_R$	1	1
$\phi_V = \phi_R$	1	1
$f_V < f_R$	0	1
$\phi_V \text{ lags } \phi_R$	0	1
$f_V > f_R$	1	0
$\phi_V \text{ leads } \phi_R$	1	0

PHASE FREQ. DET-2
FOR 50% DUTY CYCLES

INPUTS		OUTPUTS	
REF	VAR	U2	D2
0	0	1	1
0	1	1	1
1	0	0	1
1	1	1	0

0 : LOW LEVEL
1 : HIGH LEVEL

