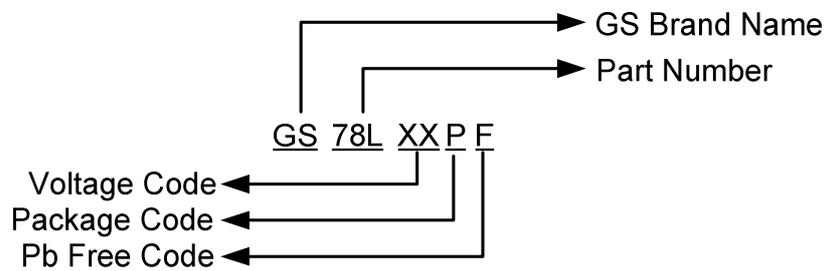


Packages & Pin Assignments

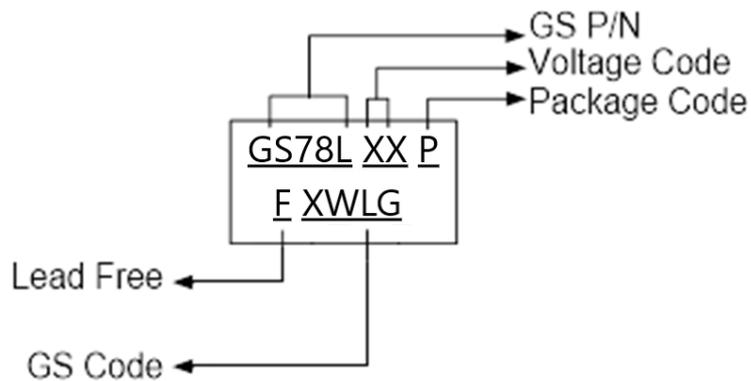
GS78LxxYF (SOT-89)			GS78LxxSF (SOP-8)			GS78LxxNF (TO-92)	
PIN NO.	GS78L05YF GS78L12YF	GS78L05YUF GS78L12YUF	PIN NO.	GS78L05SF GS78L08SF GS78L12SF	PIN NO.	GS78L05NF GS78L12NF	
1	V _{IN}	V _{OUT}	1	V _{OUT}	1	V _{OUT}	
2	GND	GND	8	V _{IN}	2	GND	
3	V _{OUT}	V _{IN}	2,3,6,7	GND	3	V _{IN}	
			4,5	NC			

Ordering Information



*Request for other voltages, please contact factory directly.

Marking Information



Absolute Maximum Ratings

($T_A=+25^{\circ}\text{C}$, unless otherwise noted.)

Symbol	Parameter	Maximum	Unit
V_{IN}	Input Voltage	30	V
P_D	Power Dissipation	SOT-89	0.5
		SOP-8	0.625
		TO-92	0.5
θ_{JA}	The Junction-To-Ambient Thermal Resistance	SOT-89	200
		SOP-8	160
		TO-92	200
T_J	Operating Junction Temperature Range	-20 to +120	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$

Operating Ratings

Parameter	Value	Unit
Temperature Range	$0 \leq T_J \leq 125$	$^{\circ}\text{C}$
Supply Voltage	7 to 27	V

GS78L05 Electrical Characteristics

($V_{IN}=10\text{V}$, $I_{OUT}=40\text{mA}$, $C_{IN}=0.33\mu\text{F}$, $C_{OUT}=0.1\mu\text{F}$, $0^{\circ}\text{C} < T_J < +125^{\circ}\text{C}$, unless otherwise noted.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$T_J=+25^{\circ}\text{C}$	4.8	5.0	5.2	V
Reg_{LINE}	Line Regulation	$T_J=+25^{\circ}\text{C}$, $I_{OUT}=40\text{mA}$ $7.0\text{V} \leq V_{IN} \leq 20\text{V}$, $8.0\text{V} \leq V_{IN} \leq 20\text{V}$	--	32	150	mV
			--	26	100	mV
Reg_{LOAD}	Load Regulation	$T_J=+25^{\circ}\text{C}$, $1.0\text{mA} \leq I_{OUT} \leq 100\text{mA}$ $T_J=+25^{\circ}\text{C}$, $1.0\text{mA} \leq I_{OUT} \leq 40\text{mA}$	--	15	60	mV
			--	8	30	mV
V_{OUT}	Output Voltage	$7.0\text{V} \leq V_{IN} \leq 20\text{V}$, $1.0\text{mA} \leq I_{OUT} \leq 40\text{mA}$ $V_{IN}=10\text{V}$, $1.0\text{mA} \leq I_{OUT} \leq 70\text{mA}$	4.75 4.75	--	5.25 5.25	V
I_B	Input Bias Current	$T_J=+25^{\circ}\text{C}$ $T_J=+125^{\circ}\text{C}$	--	2.6	6.0	mA
			--	--	5.5	mA
ΔI_B	Input Bias Current Change	$8.0\text{V} \leq V_I \leq 20\text{V}$ $1.0\text{mA} \leq I_O \leq 40\text{mA}$	--	--	1.5 0.1	mA
V_N	Output Noise Voltage	$T_A=+25^{\circ}\text{C}$, $10\text{Hz} \leq f \leq 100\text{kHz}$	--	42	--	μV
RR	Ripple Rejection	$I_{OUT}=40\text{mA}$, $f=120\text{Hz}$, $8.0\text{V} \leq V_{IN} \leq 18\text{V}$, $T_J=+25^{\circ}\text{C}$	41	49	--	dB
$V_{IN}-V_{OUT}$	Dropout Voltage	$T_J=+25^{\circ}\text{C}$	--	1.7	--	V

GS78L08 Electrical Characteristics

($V_{IN}=14V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0^{\circ}C < T_J < +125^{\circ}C$, unless otherwise noted.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$T_J=+25^{\circ}C$	7.6	8.0	8.4	V
Reg_{LINE}	Line Regulation	$T_J=+25^{\circ}C$, $I_{OUT}=40mA$ $10.5V \leq V_{IN} \leq 23V$, $11V \leq V_{IN} \leq 23V$	--	10 8	175 125	mV mV
Reg_{LOAD}	Load Regulation	$T_J=+25^{\circ}C$, $1.0mA \leq I_{OUT} \leq 100mA$ $T_J=+25^{\circ}C$, $1.0mA \leq I_{OUT} \leq 40mA$	--	15 8.0	80 40	mV mV
V_{OUT}	Output Voltage	$10.5V \leq V_{IN} \leq 23V$, $1.0mA \leq I_{OUT} \leq 40mA$ $V_{IN}=14V$, $1.0mA \leq I_{OUT} \leq 70mA$	7.6 7.6	-- --	8.4 8.4	V
I_B	Input Bias Current	$T_J=+25^{\circ}C$ $T_J=+125^{\circ}C$	-- --	3.8 --	6.0 5.5	mA
ΔI_B	Input Bias Current Change	$11V \leq V_I \leq 23V$ $1.0mA \leq I_O \leq 40mA$	-- --	-- --	1.5 0.1	mA
V_N	Output Noise Voltage	$T_A=+25^{\circ}C$, $10Hz \leq f \leq 100kHz$	--	40	--	μV
RR	Ripple Rejection	$I_{OUT}=40mA$, $f=120Hz$, $8.0V \leq V_{IN} \leq 18V$, $T_J=+25^{\circ}C$	41	49	--	dB
$V_{IN}-V_{OUT}$	Dropout Voltage	$T_J=+25^{\circ}C$	--	1.7	--	V

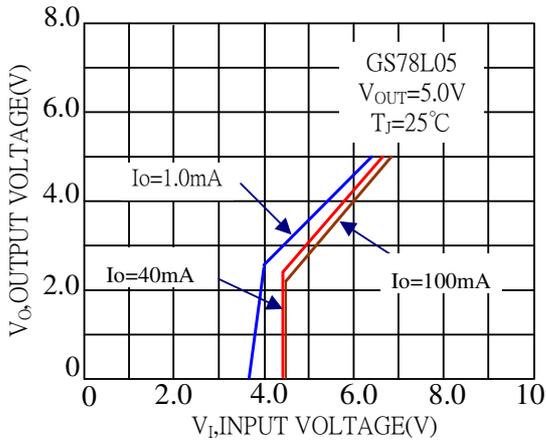
GS78L12 Electrical Characteristics

($V_{IN}=19V$, $I_{OUT}=40mA$, $C_{IN}=0.33\mu F$, $C_{OUT}=0.1\mu F$, $0^{\circ}C < T_J < +125^{\circ}C$, unless otherwise noted.)

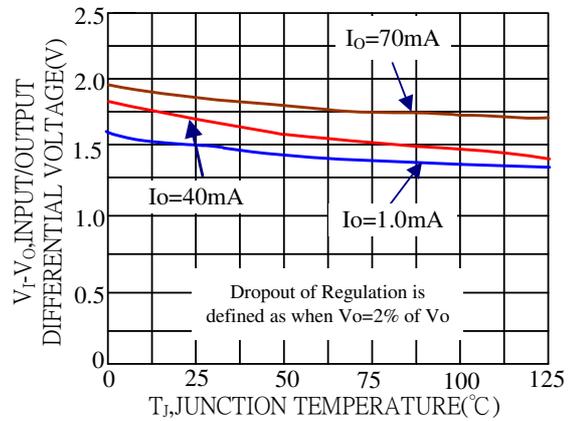
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{OUT}	Output Voltage	$T_J=+25^{\circ}C$	11.5	12	12.6	V
Reg_{LINE}	Line Regulation	$T_J=+25^{\circ}C$, $I_{OUT}=40mA$ $14.5V \leq V_{IN} \leq 27V$, $16V \leq V_{IN} \leq 27V$	-- --	25 20	300 250	mV mV
Reg_{LOAD}	Load Regulation	$T_J=+25^{\circ}C$, $1.0mA \leq I_{OUT} \leq 100mA$ $T_J=+25^{\circ}C$, $1.0mA \leq I_{OUT} \leq 40mA$	-- --	25 12	150 75	mV mV
V_{OUT}	Output Voltage	$14.5V \leq V_{IN} \leq 27V$, $1.0mA \leq I_{OUT} \leq 40mA$ $14.5V \leq V_{IN} \leq V_{max}$, $1.0mA \leq I_{OUT} \leq 70mA$	11.4 11.4	-- --	12.6 12.6	V
I_B	Input Bias Current	$T_J=+25^{\circ}C$ $T_J=+125^{\circ}C$	-- --	2.0 --	6.0 5.5	mA
ΔI_B	Input Bias Current Change	$16V \leq V_I \leq 27V$ $1.0mA \leq I_O \leq 40mA$	-- --	-- --	1.5 0.1	mA
V_N	Output Noise Voltage	$T_A=+25^{\circ}C$, $10Hz \leq f \leq 100kHz$	--	80	--	μV
RR	Ripple Rejection	$I_{OUT}=40mA$, $f=120Hz$, $15V \leq V_{IN} \leq 25V$, $T_J=+25^{\circ}C$	36	41	--	dB
$V_{IN}-V_{OUT}$	Dropout Voltage	$T_J=+25^{\circ}C$	--	1.7	--	V

Typical Performance Characteristics

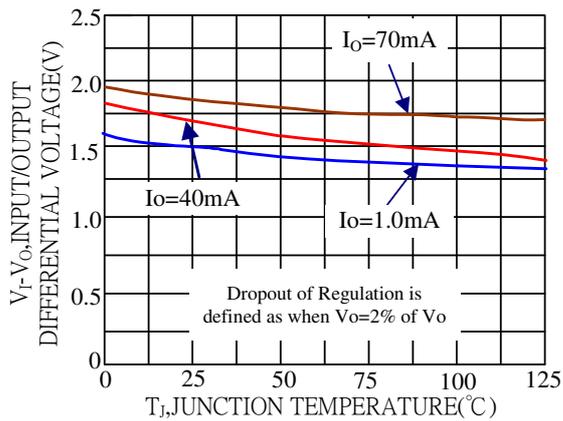
Dropout Characteristics



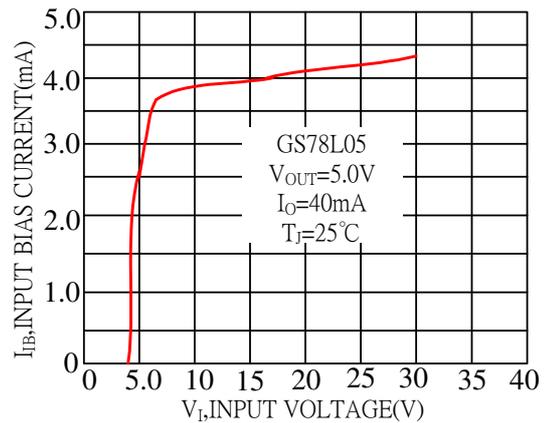
Dropout Voltage versus Junction Temperature



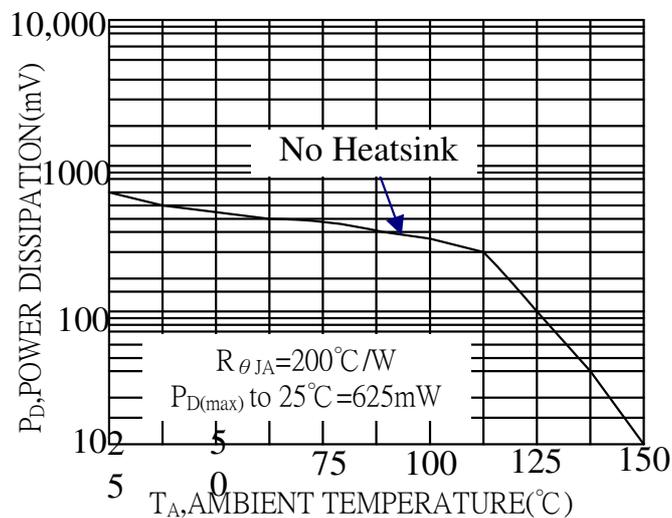
Input Bias Current versus Ambient Temperature



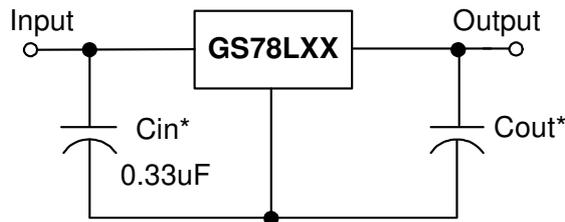
Input Bias Current versus Input Voltage



Maximum Average Power Dissipation versus Ambient Temperature TO-92 Type Package



Typical Applications



A common ground is required between the input and the output voltages.

* C_{IN} is required if regulator is located an appreciable distance from power supply filter.

** C_{OUT} is not needed for stability, however, it does improve transient response.

Design Considerations

The GS78LXX Series of fixed voltage regulators are designed with Thermal Overload Protection that shuts down the circuit when subjected to an excessive power overload condition. Internal Short Circuit Protection Limits the maximum current the circuit will pass.

In many low current applications, compensation capacitors are not required. However, it is recommended that the regulator input be bypassed with a capacitor if the regulator is connected to the power supply filter with long wire lengths, or if the output load capacitance is large. The input bypass capacitor should be selected to provide good high-frequency characteristics to insure stable operation under all load conditions. A 0.33 μ F or larger tantalum, mylar, or other capacitor having low internal impedance at high frequencies should be chosen. The bypass capacitor should be mounted with the shortest possible leads directly across the regulators input terminals. Good construction techniques should be used to minimize ground loops and lead resistance drops since the regulator has no external sense lead. Bypassing the output is also recommended.

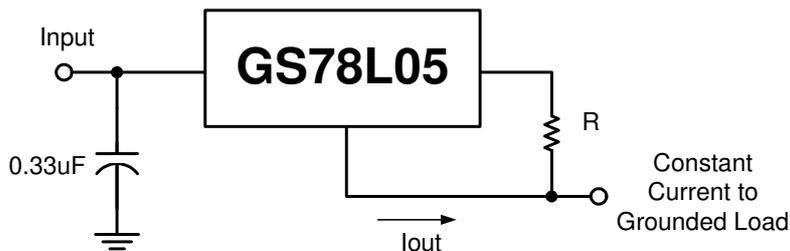
Current Regulator

The GS78LXX regulators can also be used as a current source when connected as above. In order to minimize dissipation the GS78L05 is chosen in this application. Resistor R determines the current as follows:

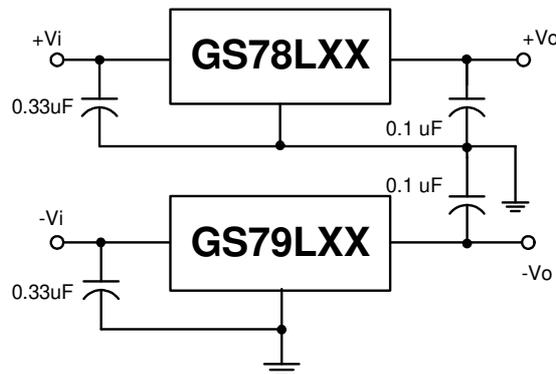
$$I_{out} = \frac{5.0V}{R} + I_B$$

$I_B=3.8mA$ over line and load changes

For example, a 100mA current source would require R to be a 50 Ω , 1/2 W resistor and the output voltage compliance would be the input voltage less 7V.

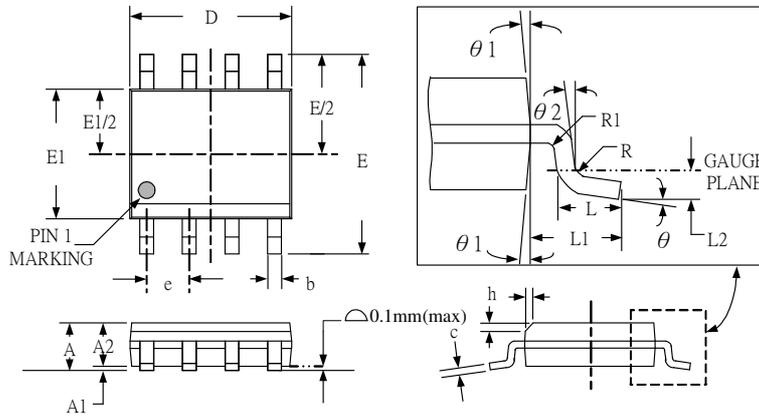


Positive and Negative Regulator



Package Dimension

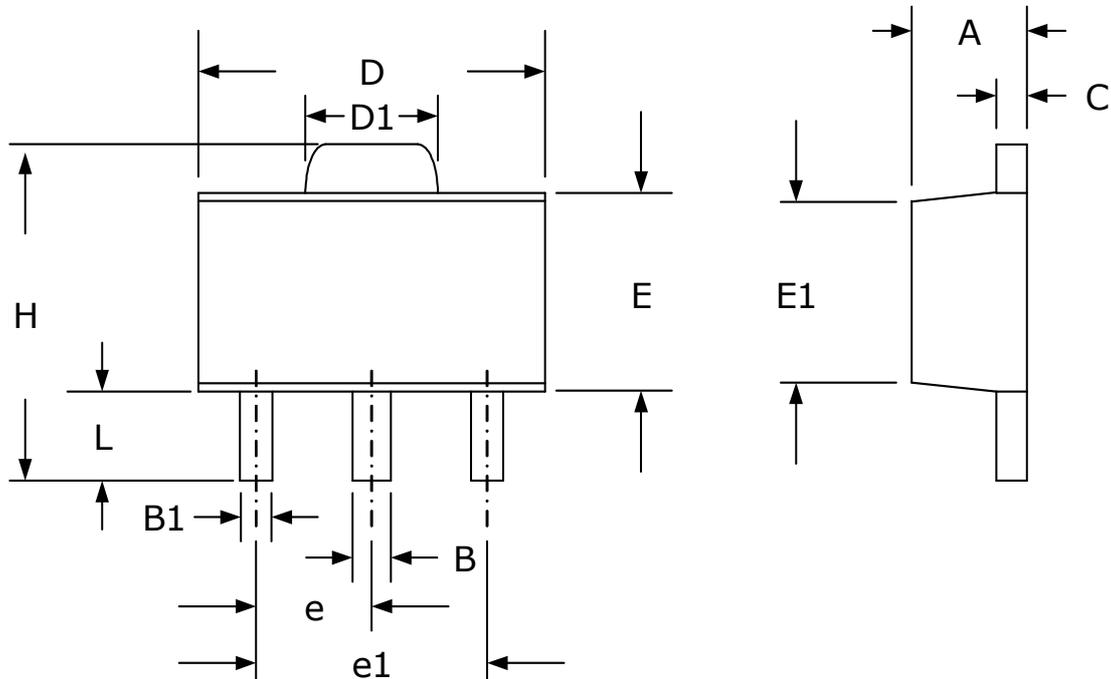
SOP-8 PLASTIC PACKAGE



Dimensions

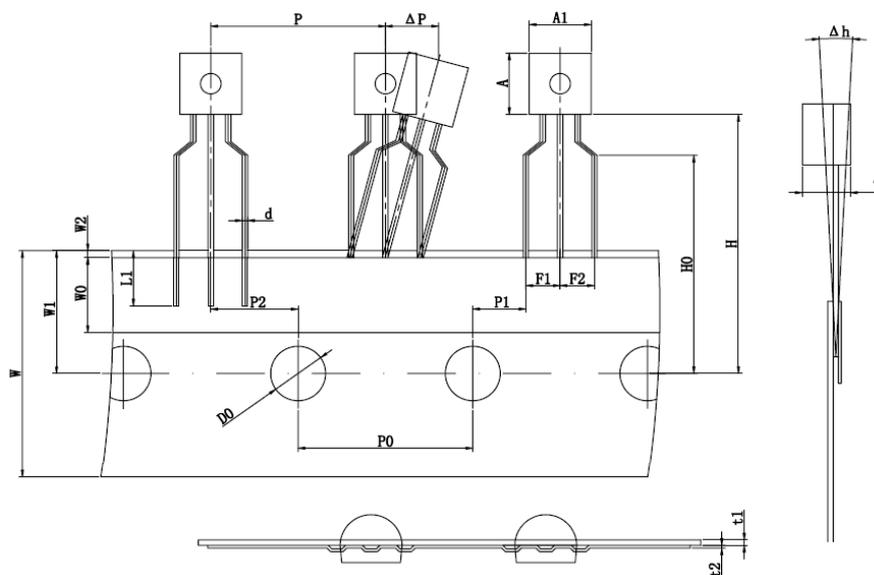
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	1.35	1.75	.053	.069
A1	0.10	0.25	.004	.010
A2	1.25	1.65	.049	.065
b	0.31	0.51	.012	.020
c	0.17	0.25	.007	.010
D	4.90 (TYP)		.193 (TYP)	
E	6.00 (TYP)		.236 (TYP)	
E1	3.90 (TYP)		.154 (TYP)	
e	1.27 (TYP)		.050 (TYP)	
L	0.40	1.27	.016	.050
L1	1.04 (TYP)		.041 (TYP)	
L2	0.25 (TYP)		.010 (TYP)	
R	0.07	-	.003	-
R1	0.07	-	.003	-
h	0.25	0.50	.010	.020
θ	0°	8°	0°	8°
θ_1	5°	15°	5°	15°
θ_2	0°	-	0°	-

SOT-89 PLASTIC PACKAGE



Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A	1.40	1.60	.055	.063
B	0.44	0.56	.017	.022
B1	0.36	0.48	.014	.019
C	0.35	0.44	.014	.017
D	4.40	4.60	.173	.181
D1	1.62	1.83	.064	.072
E	2.29	2.60	.090	.102
E1	2.13	2.29	.084	.090
e	1.50 (TYP)		.059 (TYP)	
e1	3.00 (TYP)		.118 (TYP)	
H	3.94	4.25	.155	.167
L	0.89	1.20	.035	.047

TO-92 PLASTIC PACKAGE



Dimensions

SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
A1	4.4	4.6	.173	.181
A	4.4	4.6	.173	.181
T	3.4	3.6	.133	.142
d	.36	.40	.014	.016
P	12.4	13.0	.487	.512
P0	12.5	12.9	.491	.508
P2	6.05	6.65	.238	.262
F1,F2	2.2	2.8	.086	.110
Δh	-1.0	1.0	-.039	.039
W	17.5	19	.688	.748
W0	5.5	6.5	.216	.256
W1	8.5	9.5	.334	.374
W2	-	1	-	.039
H	19.	21	.747	.827
H0	15.5	16.5	.609	.650
L1	2.5	-	.098	-
D0	3.8	4.2	.149	.165
t1	.35	.45	.014	.018
t2	.15	.25	.006	.010
P1	3.55	4.15	.140	.163
ΔP	-1	1	-.039	.039

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