

25MHz, Low-Noise, OPERATIONAL AMPLIFIERS

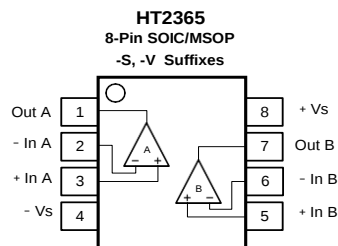
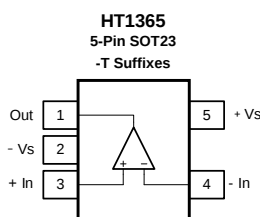
■ GENERAL DESCRIPTION

HTx365A is the dual operational amplifier, specially designed for improving the tone control, which is most suitable for the audio application. Featuring noiseless, higher gain bandwidth, high output current and low distortion ratio, and it is most suitable not only for acoustic electronic parts of audio pre-amp and active filter, but also for the industrial measurement tools. It is also suitable for the head phone amp at higher output current, and further more, it can be applied for the handy type set operational amplifier of general purpose in application of low voltage single supply type which is properly biased of the low voltage source.

■ FEATURES

- Operating Voltage ($\pm 2V \sim \pm 18V$)
- Low Input Noise Voltage ($0.8\mu V_{rms}$ typ.)
- Wide Gain Bandwidth Product (25MHz typ.)
- Low Distortion (0.0005% typ.)
- Slew Rate ($5V/\mu s$ typ.)
- Package Outline DIP8, SIP8, EMP8, SSOP8, DMP8
- Bipolar Technology

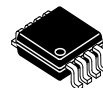
■ PIN CONFIGURATION



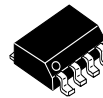
SOT23-5 T SUFFIX
HT1365ARTZ



DFN-8* D SUFFIX
HT2365ARDZ

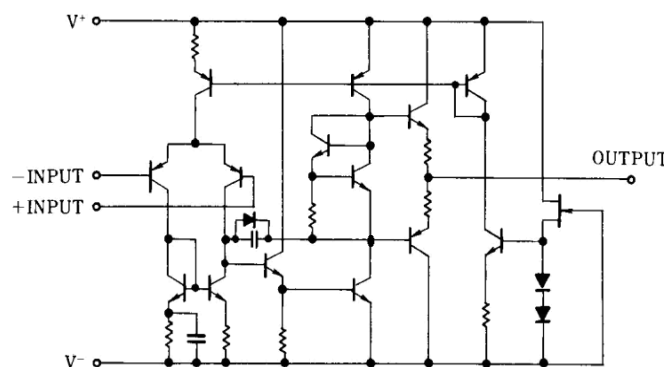


MSOP-8 M SUFFIX
HT2365ARMZ



SOP-8 R SUFFIX
HT2365ARZ

■ EQUIVALENT CIRCUIT (1/2 Shown)



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

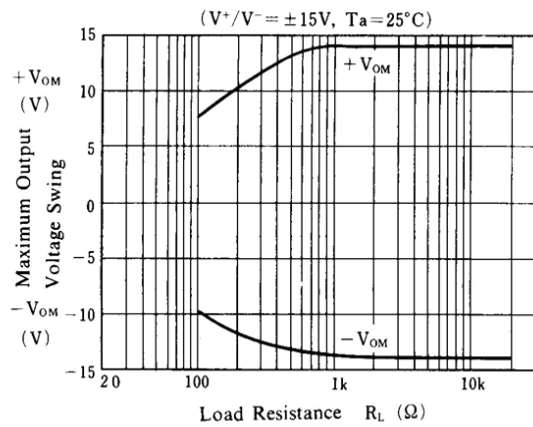
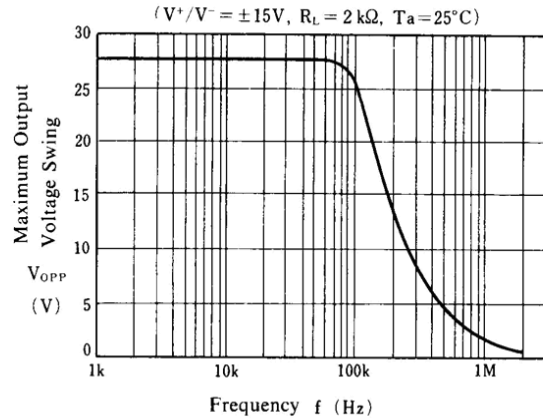
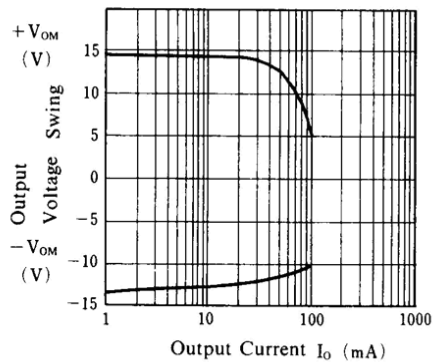
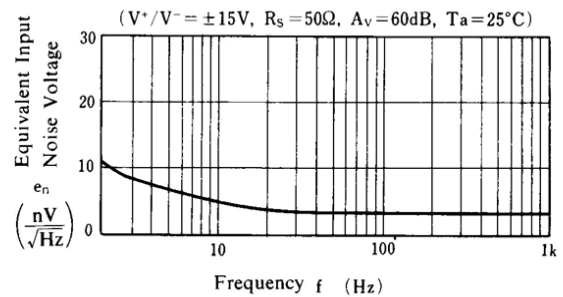
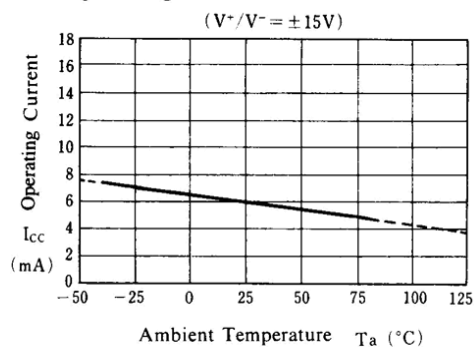
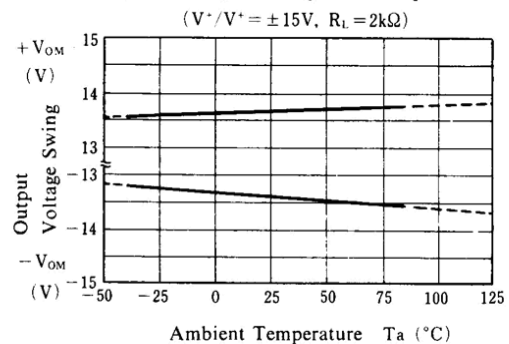
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+/V^-	± 18	V
Input Voltage	V_{IC}	± 15 (Note)	V
Differential Input Voltage	V_{ID}	± 30	V
Output Current	I_O	± 50	mA
Power Dissipation	P_D	(DIP8) 800 (SIP8) 800 (DMP8) 300 (EMP8) 300 (SSOP8) 250	mW
Operating Temperature Range	T_{opr}	-40~+85	°C
Storage Temperature Range	T_{stg}	-40~+125	°C

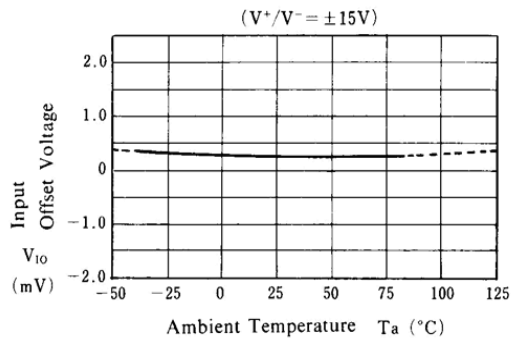
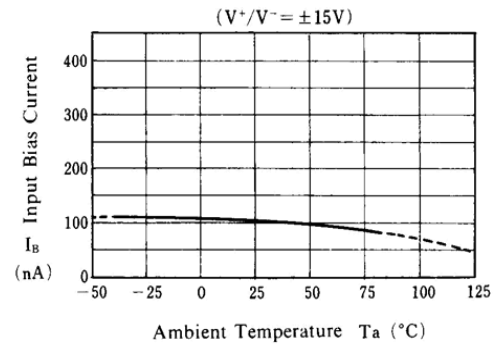
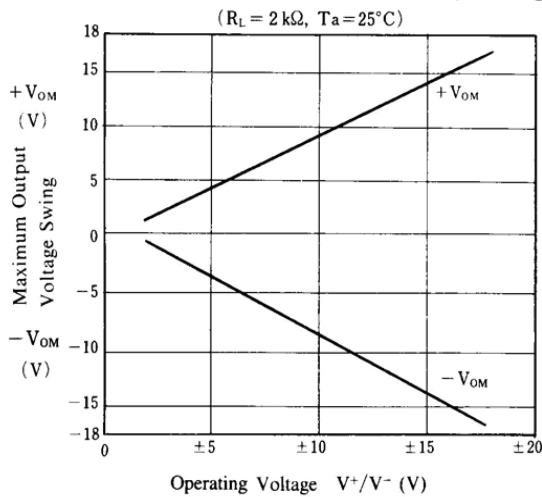
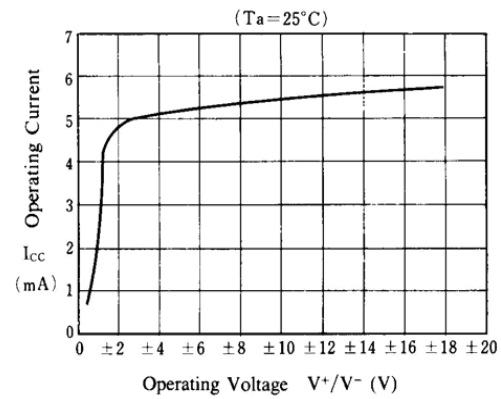
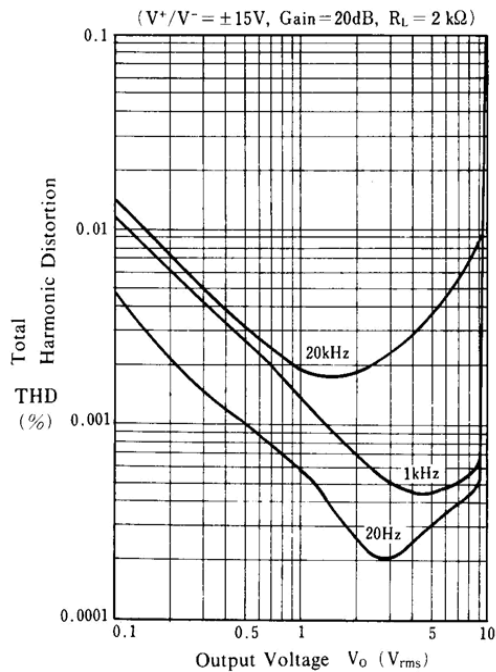
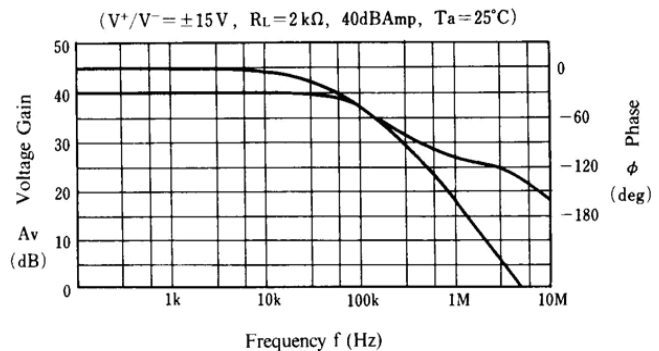
 (Note) For supply voltage less than $\pm 15V$, the absolute maximum rating is equal to the supply voltage.

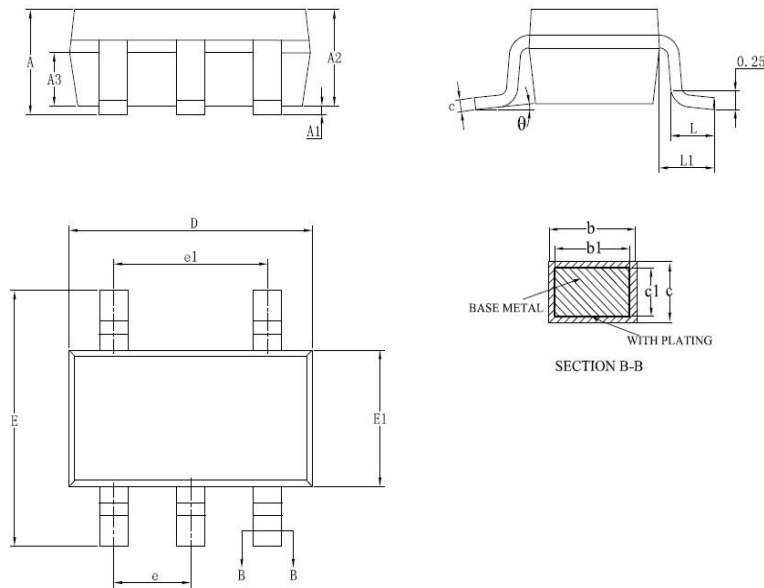
■ ELECTRICAL CHARACTERISTICS

 (Ta=25°C, $V^+/V^- = \pm 15V$)

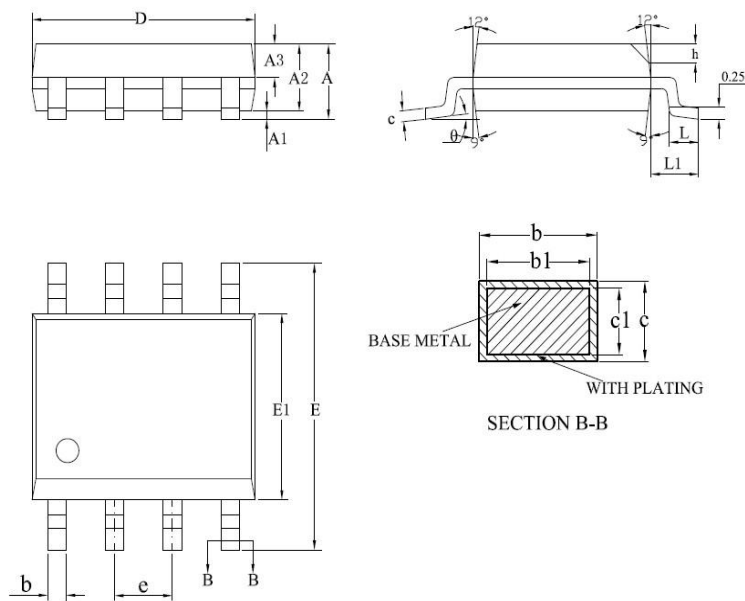
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Offset Voltage	V_{IO}	$R_S \leq 10k\Omega$	-	0.3	0.8	mV
Input Offset Current	I_{IO}		-	5	200	nA
Input Bias Current	I_B		-	100	500	nA
Large Signal Voltage Gain	A_V	$R_L \geq 2k\Omega, V_O = \pm 10V$	90	110	-	dB
Output Voltage Swing	V_{OM}	$R_L \geq 2k\Omega$	± 12	± 13.5	-	V
Input Common Mode Voltage Range	V_{ICM}		± 12	± 13.5	-	V
Common Mode Rejection Ratio	CMR	$R_S \leq 10k\Omega$	80	110	-	dB
Supply Voltage Rejection Ratio	SVR	$R_S \leq 10k\Omega$	80	110	-	dB
Operating Current	I_{CC}		-	6	9	mA
Slew Rate	SR	$R_L \geq 2k\Omega$	-	5	-	V/ μs
Gain Bandwidth Product	GB	$f = 10kHz$	-	25	-	MHz
Total Harmonic Distortion	THD	$A_V = 20dB, V_O = 5V, R_L = 2k\Omega, f = 1kHz$	-	0.0005	-	%
Input Noise Voltage	V_{NI}	RIAA, $R_S = 2.2k\Omega, 30kHz$ LPF	-	0.8	-	μV_{rms}

■ TYPICAL CHARACTERISTICS
**Maximum Output Voltage Swing
vs. Load Resistance**

**Maximum Output Voltage Swing
vs. Frequency**

**Output Voltage Swing
vs. Output Current**

**Equivalent Input Noise Voltage
vs. Frequency**

Operating Current vs. Temperature

Output Voltage Swing vs. Temperature


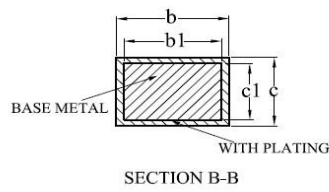
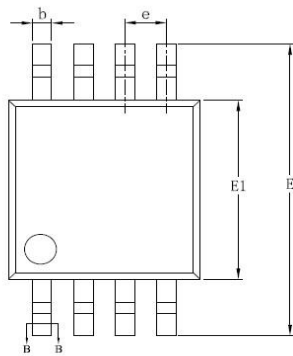
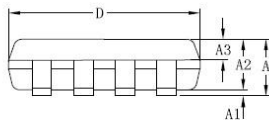
■ TYPICAL CHARACTERISTICS
Input Offset Voltage vs. Temperature

Input Bias Current vs. Temperature

Maximum Output Voltage Swing vs. Operating Voltage

Operating Current vs. Operating Voltage

Total Harmonic Distortion vs. Output Voltage

Voltage Gain, Phase vs. Frequency


SOT23-5


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.25
A1	0.04	—	0.10
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.33	—	0.41
b1	0.32	0.35	0.38
c	0.15	—	0.19
c1	0.14	0.15	0.16
D	2.82	2.92	3.02
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	0.95BSC		
e1	1.90BSC		
L	0.30	—	0.60
L1	0.60REF		
θ	0	—	8°

SOIC-8


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.75
A1	0.10	—	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	—	0.47
b1	0.38	0.41	0.44
c	0.20	—	0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	—	0.50
L	0.50	—	0.80
L1	1.05REF		
θ	0	—	8°

MSOP-8


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.10
A1	0.05	—	0.15
A2	0.75	0.85	0.95
A3	0.30	0.35	0.40
b	0.28	—	0.36
b1	0.27	0.30	0.33
c	0.15	—	0.19
c1	0.14	0.15	0.16
D	2.90	3.00	3.10
E	4.70	4.90	5.10
E1	2.90	3.00	3.10
e	0.65BSC		
L	0.40	—	0.70
L1	0.95REF		
θ	0	—	8°