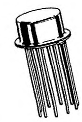
MC1552G
MC1553G

. . . a three-stage, direct-coupled, common-emitter cascade incorporating series-series feedback to achieve stable voltage gain, low distortion, and wide bandwidth. Employs a temperature-compensated dc feedback loop to stabilize the operating point and a current-biased emitter follower output. Intended for use as either a wide-band linear amplifier or as a fast rise pulse amplifier.



Lead 6 connected to case

CASE 71

Typical Amplifier Features:

- High Gain – 34 dB ±1.0 dB (MC1552)
  52 dB ±1.0 dB (MC1553)
- Wide Bandwidth – 40 MHz (MC1552)
  35 MHz (MC1553)
- Low Distortion – 0.2% at 200 kHz
- Low Temperature Drift – ±0.002 dB/°C

MAXIMUM RATINGS ($T_A = 25°C$ unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage, Pin 9	V^+	9	Vdc
Input Voltage, Pin 1 to Pin 2 (R_S = 500 ohms)	V_{in}	1.0	V(RMS)
Power Dissipation (Package Limitation) Derate above 25°C	P_D	680 4.6	mW mW/°C
Operating Temperature Range	T_A	-55 to +125	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C

CIRCUIT SCHEMATICS

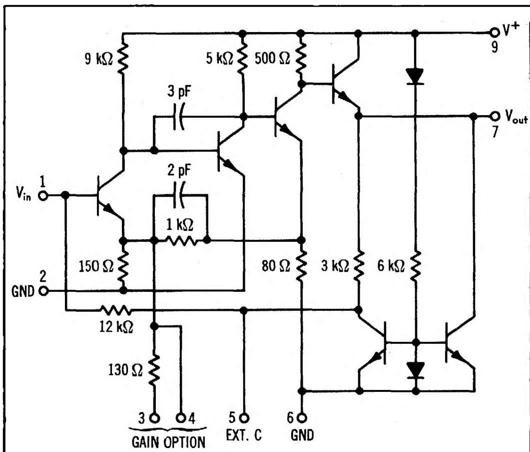


FIGURE 1 – MC1552 (LOW GAIN)

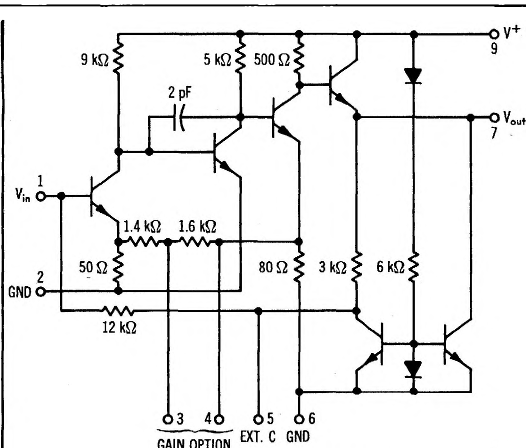


FIGURE 2 – MC1553 (HIGH GAIN)

ELECTRICAL CHARACTERISTICS ($V+ = +6$ Vdc, $T_A = 25°C$ unless otherwise noted)

Characteristic		Fig. No.	Gain Option*	Symbol	Min	Typ	Max	Unit
Voltage Gain	MC1552	3	50 100	V_{out}/V_{in}	44 87	50 100	56 113	V/V
	MC1553		200 400		175 350	200 400	225 450	
Voltage Gain Variation (T_A = -55°C to +125°C)		3	All	—	—	±0.2	—	dB
Bandwidth	MC1552	3, 6	50 100	BW	21 17	40 35	— —	MHz
	MC1553		200 400		17 7.5	35 15	— —	
Input Impedance (f = 100 kHz, R_L = 1 kΩ)		—	All	$\|Z_{in}\|$	7	10	—	kΩ
Output Impedance (f = 100 kHz, R_S = 50 Ω)		—	All	$\|Z_{out}\|$	—	16	50	Ω
DC Output Voltage		3	All	V_{out} (dc)	2.5	2.9	3.2	Vdc
DC Output Voltage Variation (T_A = -55°C to +125°C)		3	All	ΔV_{out} (dc)	—	±0.05	—	Vdc
Output Voltage Swing ($Z_L \geq$ 1 kΩ, V_{in} = 100 mV rms)		3	All	V_{out}	3.6	4.2	—	Vp-p
Power Dissipation		—	All	P_D	—	75	120	mW
Delay Time	MC1552	3, 4	50 100	t_{pd}	— —	8 9	— —	ns
	MC1553		200 400		— —	10 25	— —	
Rise Time	MC1552	3, 4	50 100	t_r	— —	9 12	16 20	ns
	MC1553		200 400		— —	11 30	20 45	
Overshoot		3, 4	All	$(V_{os}/V_p)100$	—	5	—	%
Noise Figure (R_S = 400 Ω, f_o = 30 MHz, BW = 3 MHz)		—	All	NF	—	5	—	dB
Total Harmonic Distortion (V_{out} = 2 Vp-p, f = 200 kHz, R_L = 1 kΩ)		—	All	THD	—	0.2	—	%

*To obtain the voltage-gain characteristic desired, use the following pin connections:

Type	Voltage Gain	Pin Connections
MC1552	50	Pin 3 Open
	100	Ground Pin 3
MC1553	200	Connect Pin 3 to Pin 4
	400	Pins 3 and 4 Open

NOTES

1. Ground Pin 6 as close to can as possible to minimize overshoot. Best results by directly grounding can.

2. If large input and output coupling capacitors are used, place shield between them to avoid input-output coupling.

3. A high-frequency capacitor must always be used to bypass the power supply. This capacitor should be as close to the circuit as possible.

4. Voltage gain can be adjusted to any value between 50 and 3000 by connecting an external resistor from Pin 4 to ground on MC1552, or from Pin 3 to ground on MC1553, as shown in Figure 8. Under these conditions, the following equations must be used to determine C_1 and C_2 rather than the circuits shown in Figure 5.

Fig. 5b $C_1 = \frac{1}{2\pi f_c (1.7 \times 10^4)}$ Farads; $C_2 = 8\, C_1 (V_{out}/V_{in})$ Farads

Fig. 5c $C_1 = \frac{V_{out}/V_{in}}{2\pi f_c (1.5 \times 10^4)}$ Farads

Fig. 5d $C_2 = \frac{V_{out}/V_{in}}{2\pi f_c (3 \times 10^3)}$ Farads

FIGURE 3—TEST CIRCUIT

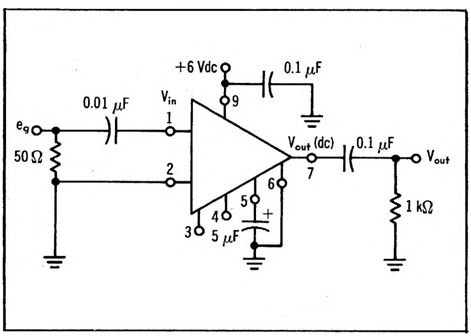
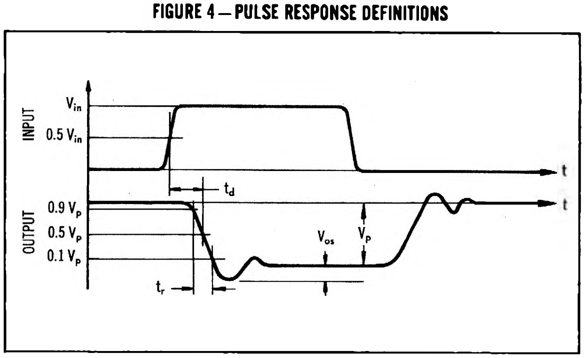


FIGURE 4—PULSE RESPONSE DEFINITIONS



TYPICAL CHARACTERISTICS

$T_A = 25°C$

FIGURE 5a — FREQUENCY RESPONSE

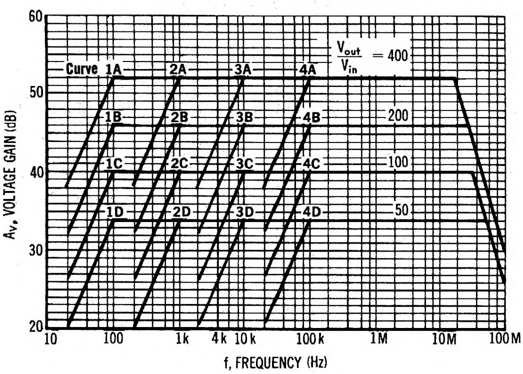
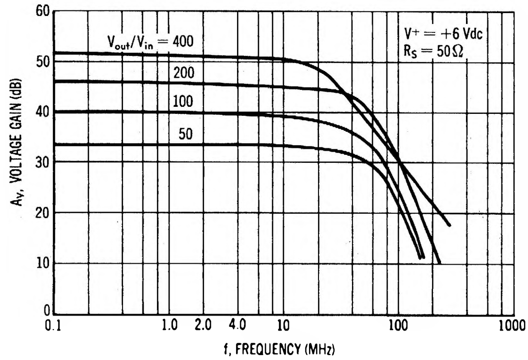
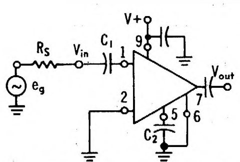


FIGURE 6 — VOLTAGE GAIN versus FREQUENCY



TEST CIRCUITS FOR FREQUENCY RESPONSE

FIGURE 5b — CAPACITIVE COUPLED INPUT (R_s < 5kΩ)



Curve No.	C_1 (μF)	C_2 (μF)
1A	0.1	250
1B	0.1	150
1C	0.1	70
1D	0.1	40

Curve No.	C_1 (μF)	C_2 (μF)
2A	0.01	30
2B	0.01	18
2C	0.01	8.0
2D	0.01	4.0
	(pF)	
3A	1000	3.0
3B	1000	1.8
3C	1000	0.8
3D	1000	0.4
4A	100	0.3
4B	100	0.18
4C	100	0.08
4D	100	0.04

FIGURE 7 — MAXIMUM NEGATIVE SWING SLEW RATE versus LOAD CAPACITANCE

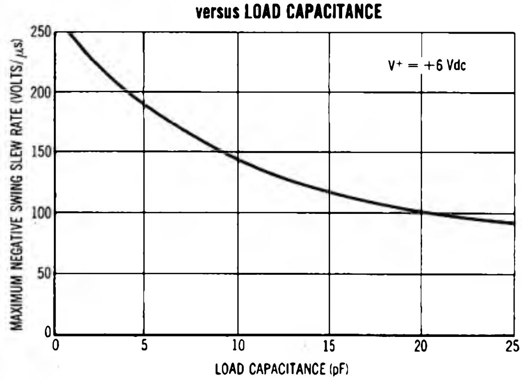
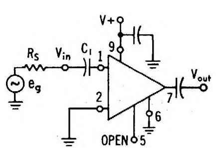


FIGURE 5c — CAPACITIVE COUPLED INPUT (R_s < 500 Ω)



Curve No.	C_1 (μF)
1A	20
1B	10
1C	7.0
1D	3.0
2A	3.0
2B	1.0
2C	0.8
2D	0.5

Curve No.	C_1 (μF)
3A	0.4
3B	0.2
3C	0.1
3D	0.06
4A	0.04
4B	0.02
4C	0.01
4D	0.007

FIGURE 8 — VOLTAGE GAIN ADJUSTMENT BY USE OF EXTERNAL RESISTOR

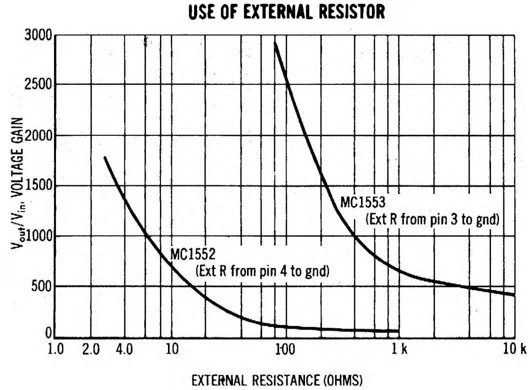
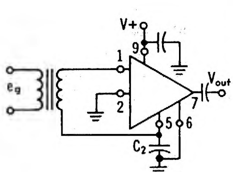


FIGURE 5d — TRANSFORMER COUPLED INPUT



Curve No.	C_2 (μF)
1A	200
1B	100
1C	70
1D	30
2A	20
2B	10
2C	7.0
2D	3.0

Curve No.	C_2 (μF)
3A	2.0
3B	1.0
3C	0.7
3D	0.3
4A	0.2
4B	0.1
4C	0.07
4D	0.03

INPUT ADMITTANCE

V+ = 6 Vdc, R_L = 1 kΩ, T_A = 25°C

FIGURE 9 — GAIN = 50

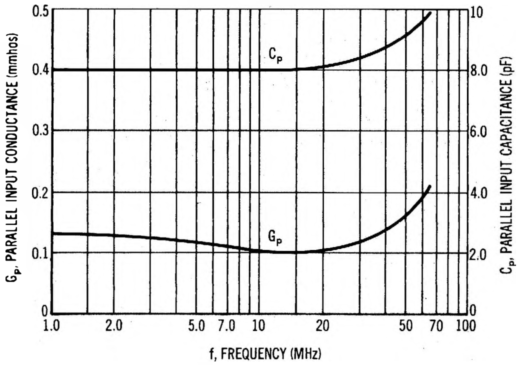


FIGURE 10 — GAIN = 100

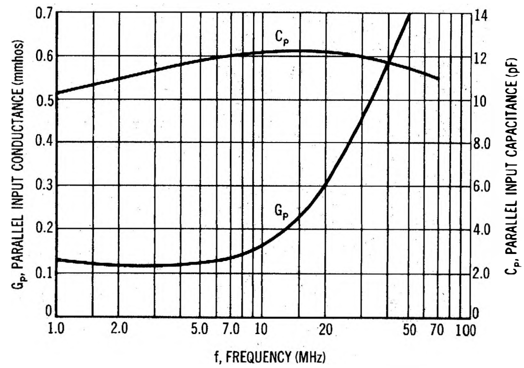


FIGURE 11 — GAIN = 200

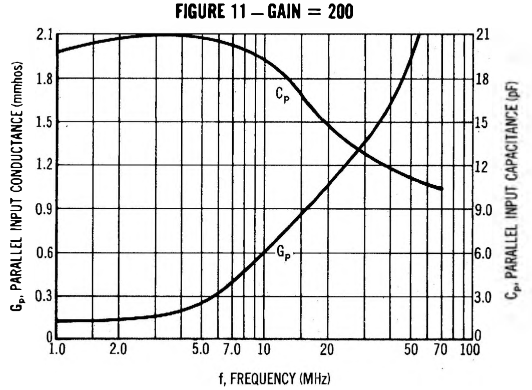


FIGURE 12 — GAIN = 400

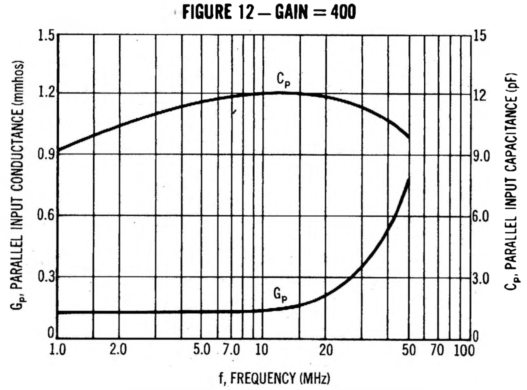


FIGURE 13 — OUTPUT IMPEDANCE versus FREQUENCY

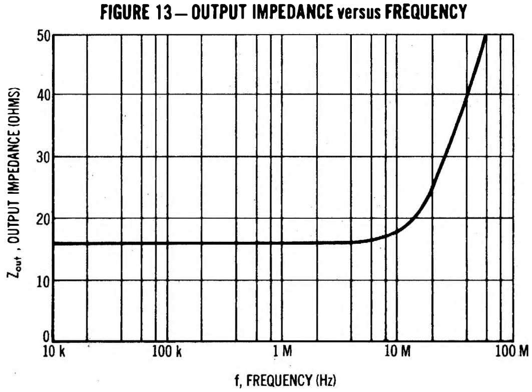


FIGURE 14 — BANDWIDTH versus SOURCE RESISTANCE