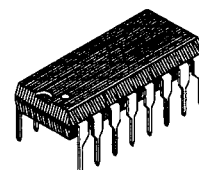


MB4104 and MB4105

FM Stereo Multiplex Demodulator

The Fujitsu MB4104 and MB4105 is a monolithic FM stereo multiplex demodulator fabricated with Fujitsu's advanced bipolar technology. Using PLL circuitry, this device achieves stable performance against the variance condition of external elements.

- Separate control circuit reduces noise in a weak electrical field
- PLL circuitry means fewer external components
- Reduced IFM noise in weak electrical fields with high cut control circuit
- Low distortion: 0.06% typical at 300 mV input
- On-chip forced monaural and VCO stop, lamp driver, and audio muting circuits
- MB4105 has a separate pilot signal and composite signal inputs
- Package and ordering information:
 - 16-pin plastic DIP,
 - order as MB4104P or MB4105P



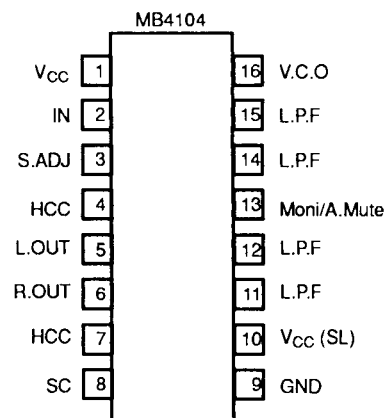
Plastic DIP Package
(DIP-16P-M04)

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

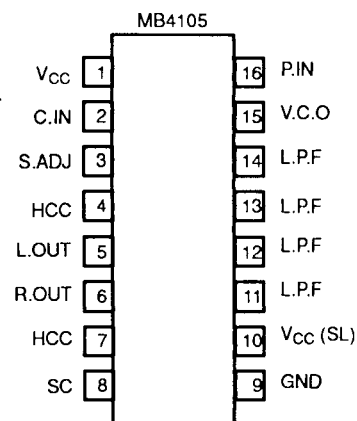
Ratings	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	16	V
Lamp Drive Current	I_L	75	mA
Power Dissipation	P_D	520	mW
Operating Temperature	T_{OP}	-20 to +75	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to +125	$^\circ\text{C}$

Note: Permanent device damage may occur if absolute maximum ratings are exceeded. Functional operation should be restricted to the conditions as detailed in the operational sections of this data sheet. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

PIN ASSIGNMENT TOP VIEW



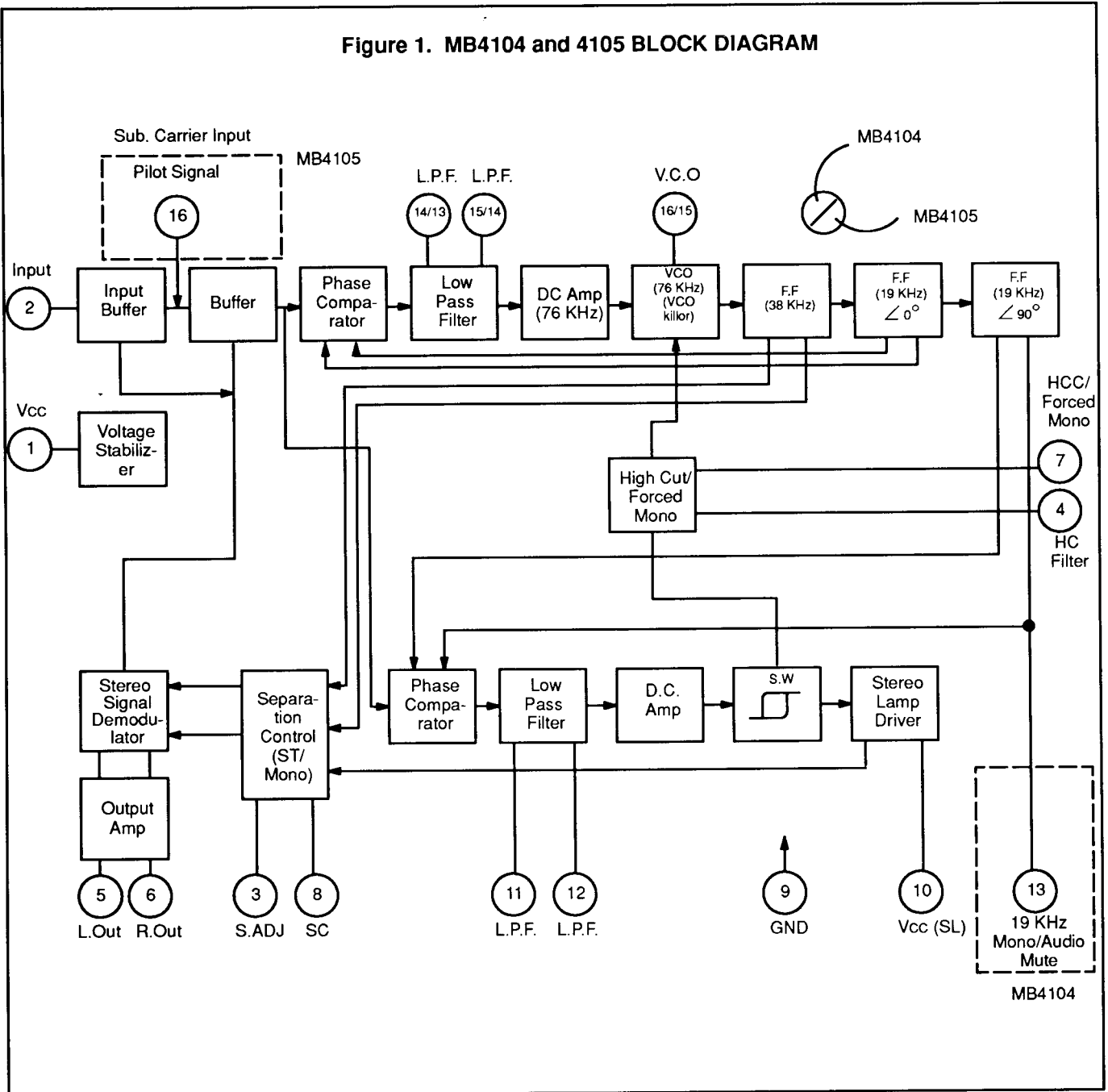
PIN ASSIGNMENT



This device contains circuitry to protect the inputs against damage due to high static voltages or electric fields. However, it is advised that normal precautions be taken to avoid application of any voltage higher than maximum rated voltages to this high impedance circuit.

BLOCK DIAGRAM

Figure 1. MB4104 and 4105 BLOCK DIAGRAM



RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value	Unit
Power Supply Voltage	V _{CC}	8 to 14	V
Operating Temperature	T _{OP}	-20 to +75	°C

ELECTRICAL CHARACTERISTICS

MB4104

(V_{CC} = 10 V, V_{IN} = 300 mVrms, f = 1 KHz, L + R = 90 %, Pilot = 10 %, T_A = 25 °C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Quiescent Power Supply Current	I _Q	V _{IN} = 0V		16	25	mA
Channel Separation	CS		40	55		dB
Total Harmonic Distortion	THD	Stereo		0.06	0.3	%
		Mono		0.06	0.3	%
Output Voltage	V _O		210	300	420	mVrms
Channel Balance	CB			0	1.5	dB
Lamp Level		Pilot Signal	5	8	12	mV
Lamp Hysteresis		Pilot Signal		4.5	7	dB
SCA Rejection Ratio				80		dB
S/N Ratio	S/N		70	78		dB
Input Impedance	R _{IN}		20	30		kΩ
Capture Range	CR	Pilot = 30 mV		±4		%
Maximum Input Voltage	V _{IN (MAX)}	THD ≤ 1%	600	1000		mVrms
SC Output Attenuation		V ₈ = 0.6V, Sub	-12	-6	-1	dB
SC Output Voltage		V ₈ = 0.1 V, Sub			5	mV
HCC Output Attenuation 1		V ₇ = 1.2V	-3	-1	0	dB
HCC Output Attenuation 2		V ₇ = 0.6V	-18	-10	-2	dB
Power Supply Ripple Rejection Ratio	R.R.			35		dB
Audio Mute Attenuation		V ₁₃ = 0.2V		55		dB

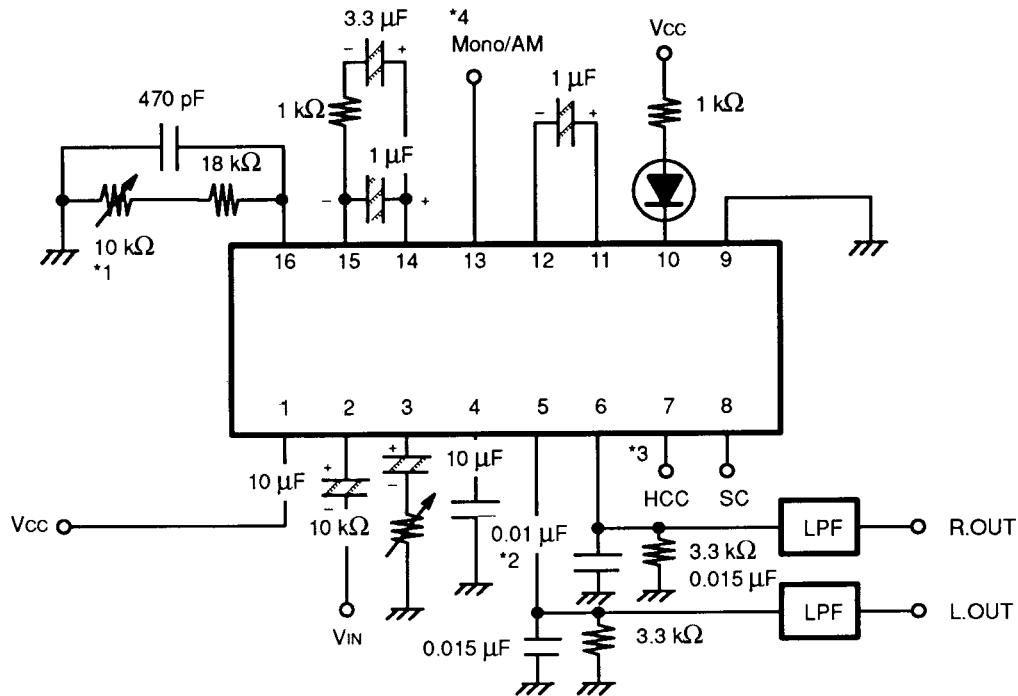
ELECTRICAL CHARACTERISTICS (Continued)

MB4105

($V_{CC} = 10\text{ V}$, $V_{IN} = 300\text{ mVrms}$, $f = 1\text{ KHz}$, $L + R = 90\%$, $\text{Pilot} = 10\%$, $T_A = 25\text{ }^\circ\text{C}$)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Power Supply Current	I_{CC}	$V_{IN} = 0\text{ V}$		18	25	mA
Channel Separation	CS		40	55		dB
Total Harmonic Distortion	THD	Stereo		0.06	0.3	%
		Mono		0.06	0.3	%
Output Voltage	V_O		210	300	420	mVrms
Channel Balance	CB			0	1.5	dB
Lamp Level		Pilot Signal	5	8	12	mV
Lamp Hysteresis		Pilot Signal		4.5	7	dB
SCA Rejection Ratio				80		dB
S/N Ratio	S/N		70	78		dB
Input Impedance	R_{IN}		20	30		$k\Omega$
Capture Range	CR	Pilot = 30 mV		± 4		%
Maximum Input Voltage	$V_{IN(MAX)}$	THD $\leq 1\%$	600	1000		mVrms
SC Output Attenuation		$V_8 = 0.6\text{ V}$, Sub	-12	-6	-1	dB
SC Output Voltage		$V_8 = 0.1\text{ V}$, Sub			5	mV
HCC Output Attenuation 1		$V_7 = 1.2\text{ V}$	-3	-1	0	dB
HCC Output Attenuation 2		$V_7 = 0.6\text{ V}$	-18	-10	-2	dB
Power Supply Ripple Rejection Ratio	R.R.			35		dB
Audio Mute Attenuation				55		dB

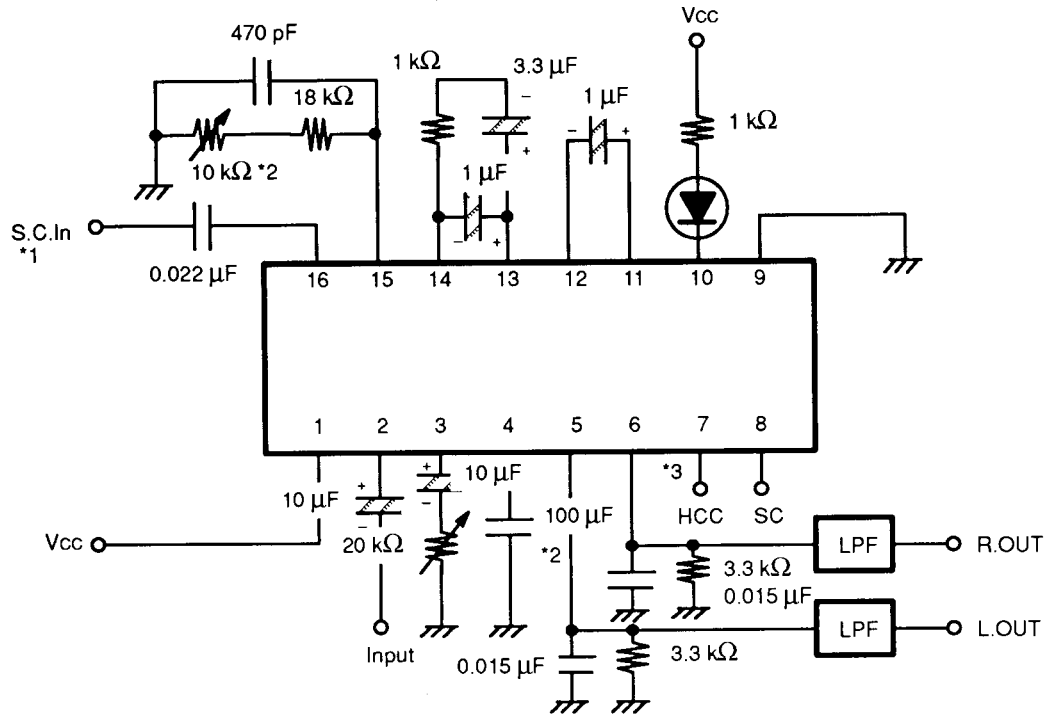
Figure 2. MB4104 TEST CIRCUIT



Notes:

- *1 VCO free running frequency should be adjusted at 19.000 KHz \pm 10 Hz.
- *2 The value is 100 μ F when SC and HCC are measured.
- *3 When 7.0 V or more is applied to pin 7, the device is forced into a monaural mode and VCO stops. If a voltage higher than Vcc is applied to pin 7, a 10 K Ω resistor should be inserted.
- *4 When pin 13 = GND, or is lower than 0.4 V, the device is in an audio mute mode.

Figure 3. MB4105 TEST CIRCUIT



Notes:

- *1 The pilot signal can be inserted into pin 16 and the input signal can be inserted, without the pilot signal. This separation of signals makes the design of an LPF easier.
- *2 VCO (76 KHz) signal should be adjusted.
- *3 When 7.0 V or more is applied to pin 7, the device is forced into a monaural mode and VCO stops. If a voltage higher than Vcc is applied to pin 7, a 10 KΩ resistor should be inserted.

TYPICAL PERFORMANCE CHARACTERISTICS

Figure 4
TOTAL HARMONIC DISTORTION (MAIN and MONO),
C.B. vs INPUT VOLTAGE

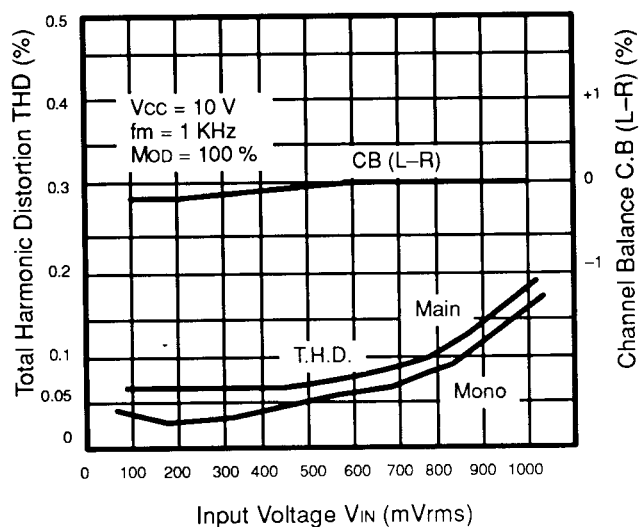
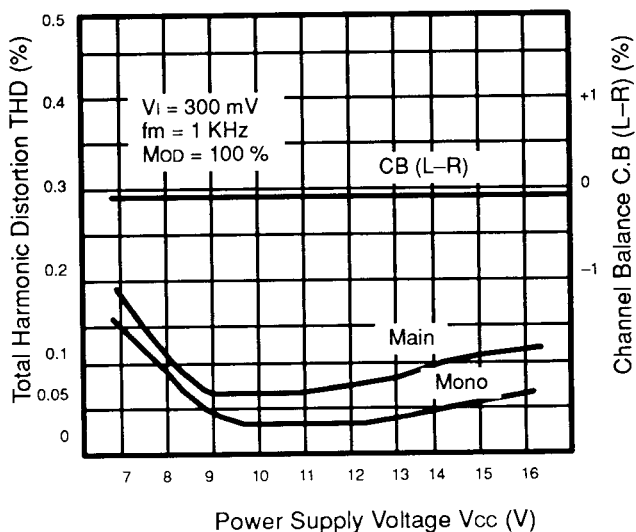


Figure 5
TOTAL HARMONIC DISTORTION (MAIN and MONO),
C.B. vs POWER SUPPLY VOLTAGE



Channel Separation CS (dB)
Channel Separation CS (dB)

Figure 6
CHANNEL SEPARATION
vs INPUT VOLTAGE

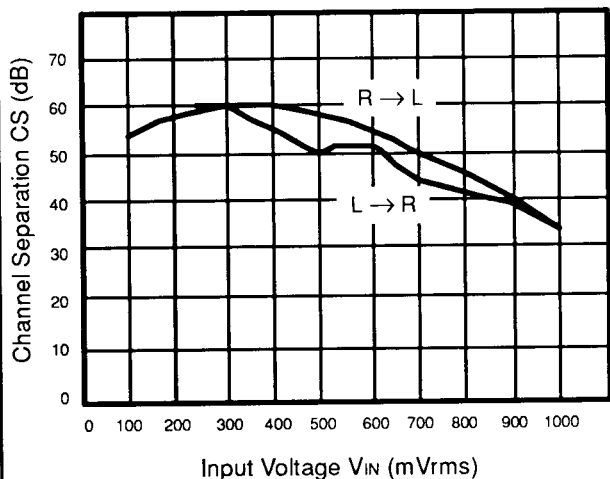


Figure 7
CHANNEL SEPARATION
vs POWER SUPPLY VOLTAGE

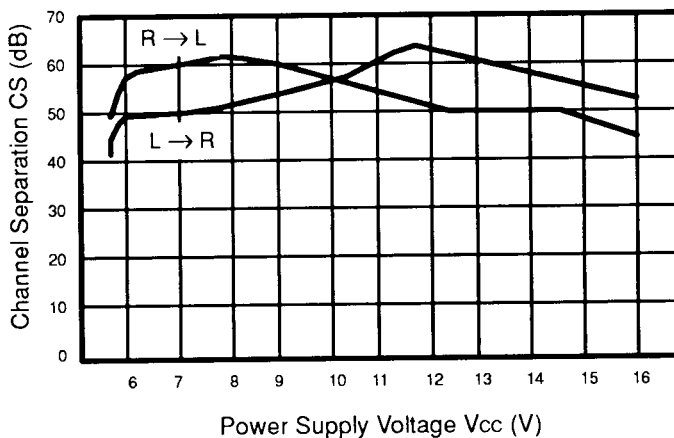


Figure 8
VOLTAGE GAIN, TOTAL HARMONIC
DISTORTION vs FREQUENCY

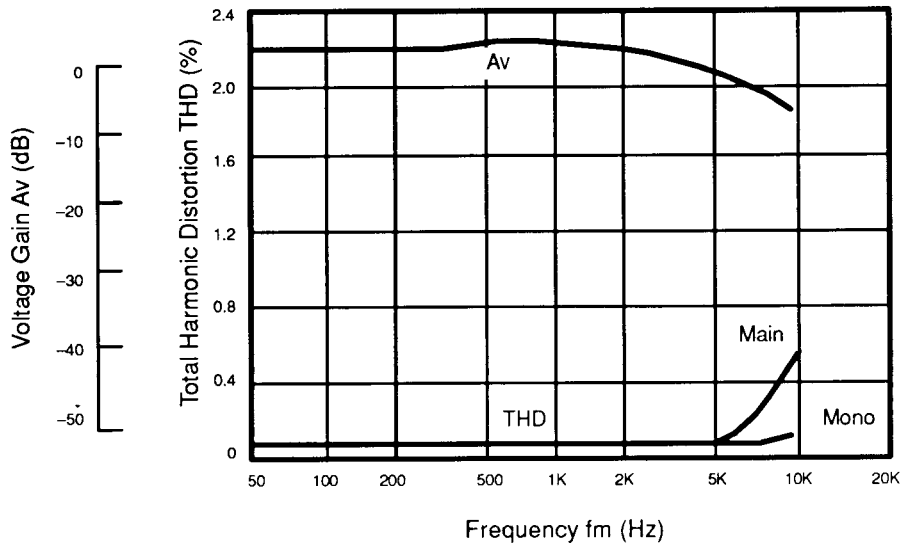


Figure 9
CHANNEL SEPARATION
vs FREQUENCY

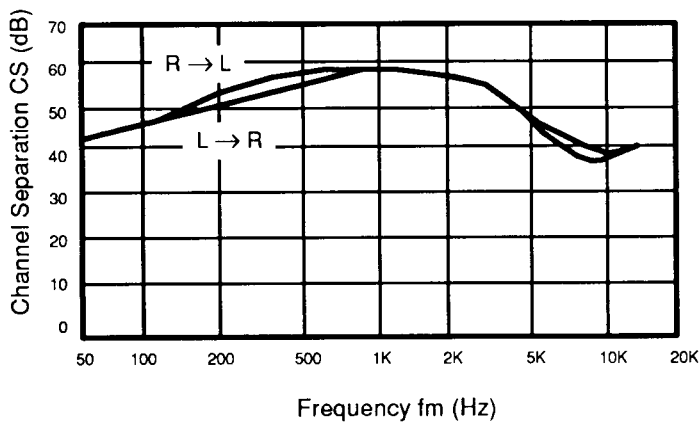


Figure 10
CHANNEL SEPARATION
vs INPUT VOLTAGE AT PIN 8

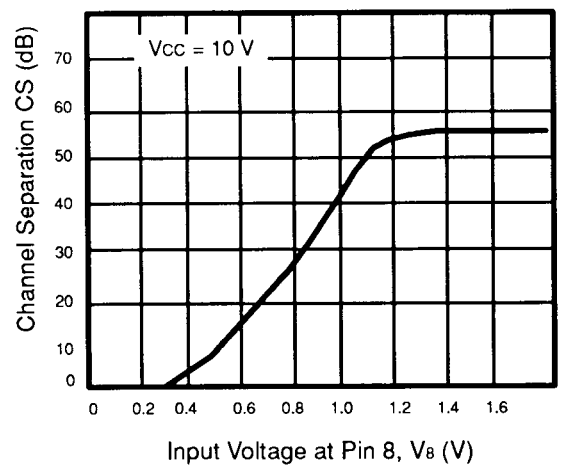


Figure 11
ATTENUATION vs INPUT
VOLTAGE AT PIN 7

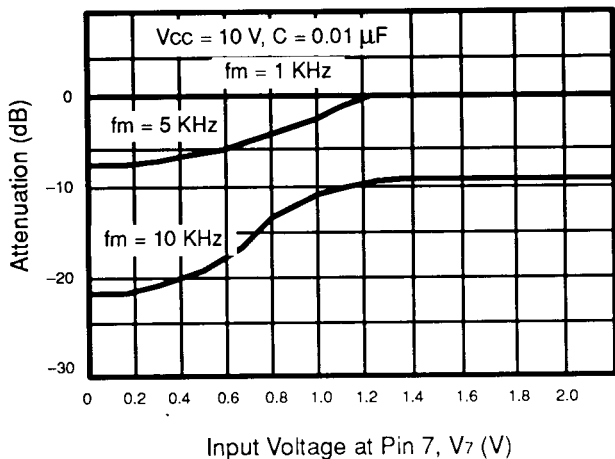


Figure 12
INPUT VOLTAGE vs OSCILLATOR
FREE RUNNING FREQUENCY

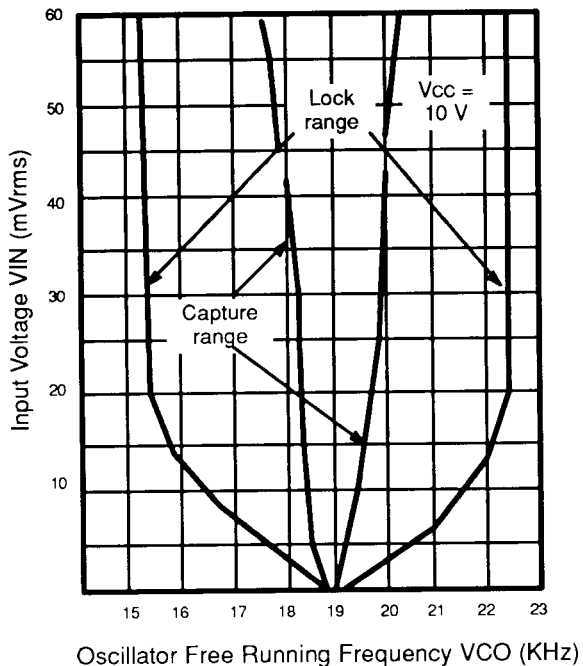


Figure 13
PILOT SIGNAL VOLTAGE vs
POWER SUPPLY VOLTAGE

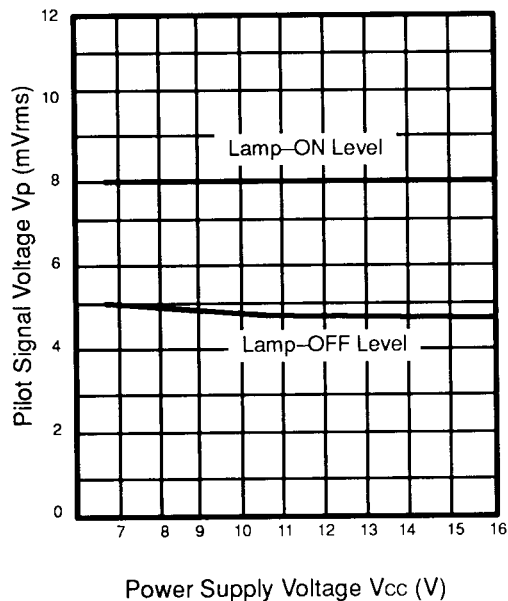


Figure 14
TOTAL HARMONIC DISTORTION, CHANNEL
SEPARATION vs OSCILLATOR FREE
RUNNING FREQUENCY

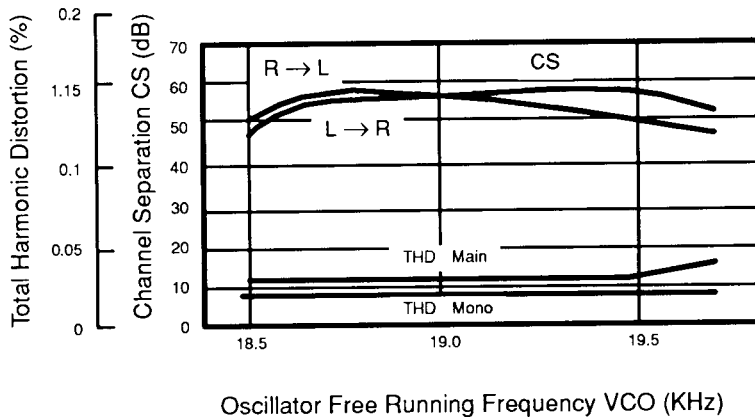


Figure 15
PILOT SIGNAL VOLTAGE
vs TEMPERATURE

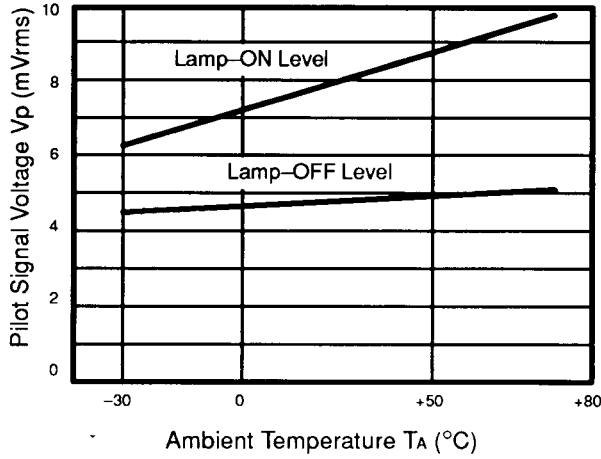


Figure 16
OSCILLATOR FREE RUNNING FREQUENCY
ERROR vs TEMPERATURE

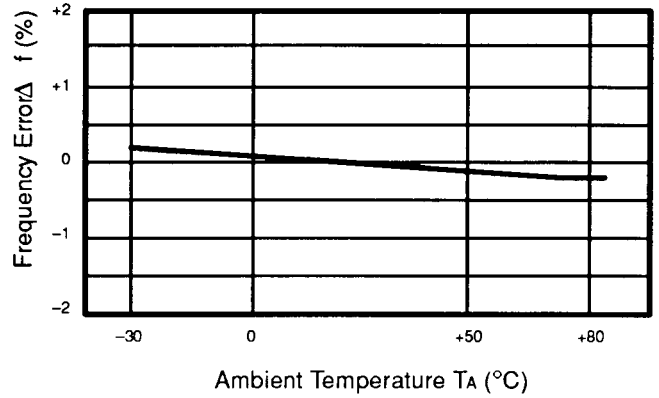


Figure 17
OSCILLATOR FREE RUNNING FREQUENCY
ERROR vs POWER SUPPLY VOLTAGE

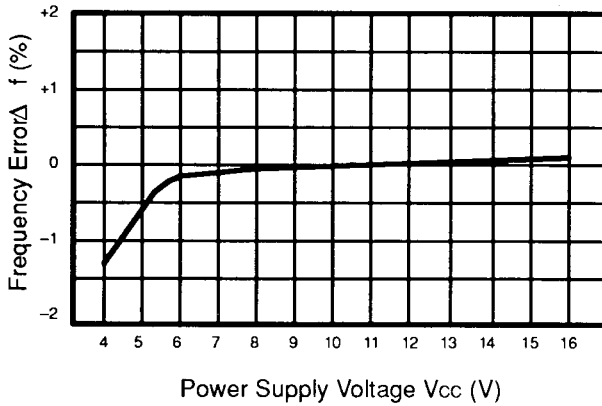
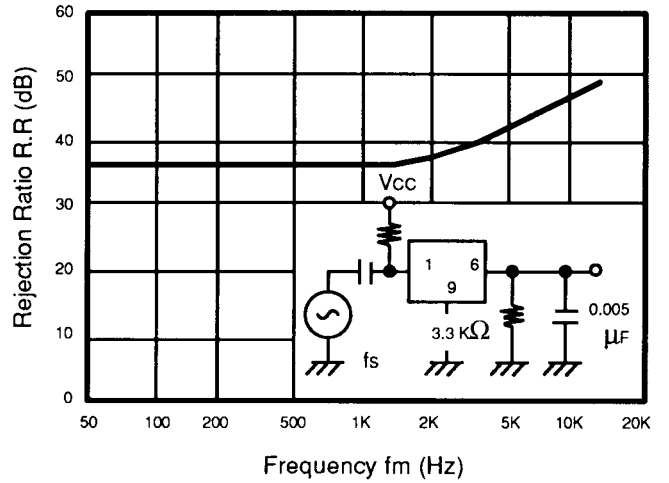
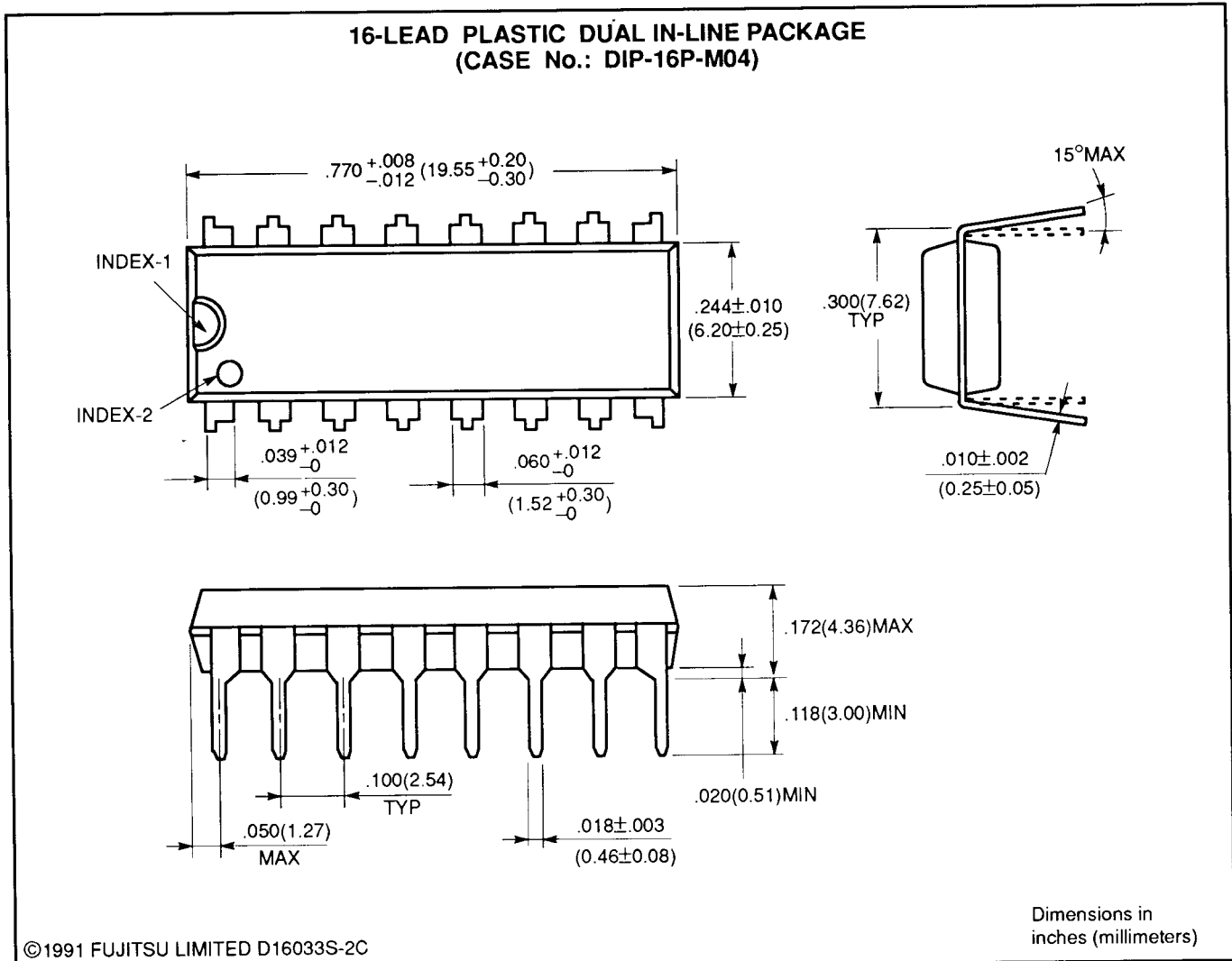


Figure 18
POWER SUPPLY RIPPLE REJECTION
RATIO vs FREQUENCY



PACKAGE DIMENSIONS



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