

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

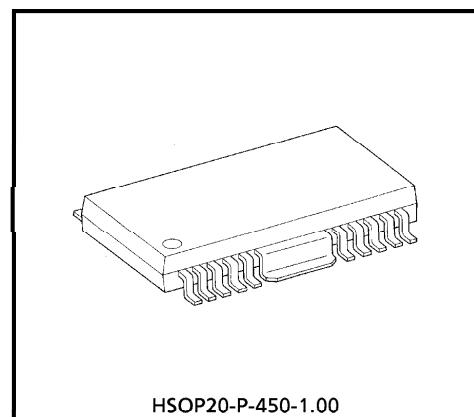
TA2058F

POWER DRIVER IC FOR CD PLAYER

TA2058F is a power driver IC developed for CD players. This IC have built-in 4 channel BTL power amplifiers which drives focus-coil and tracking coil for 3-beam pick-up head, disc motor and feed motor.

FEATURES

- 4 channel BTL linear drivers
- Few external parts
- Fixed voltage gain
: $G_v = 15\text{dB}$ (Typ.)
- High output power
: $V_{OM1} = 5V_{p-p}$ (Typ.) $V_{CC} = 5V$, $R_L = 50\Omega$
: $V_{OM2} = 6V_{p-p}$ (Typ.) $V_{CC} = 6V$, $R_L = 50\Omega$
- Thermal shut down protector
- Input reference voltage short protector
- Small Package
: Power-flat package 1mm pitch 20pins
- Operation Supply Voltage Range
: $V_{CC(opr)} = 4.0 \sim 10.0V$ ($T_a = 25^\circ\text{C}$)

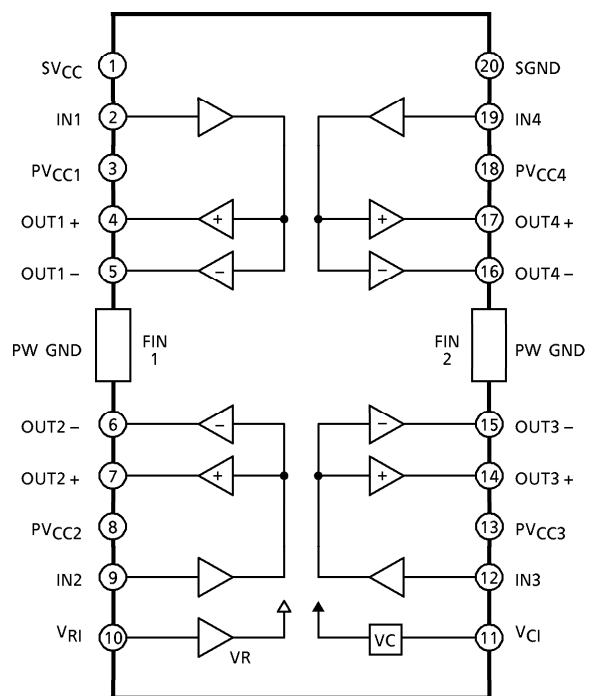


Weight : 0.8g (Typ.)

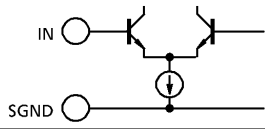
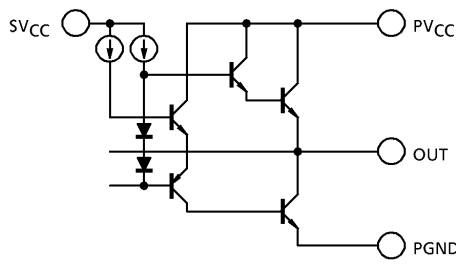
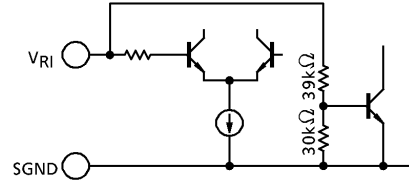
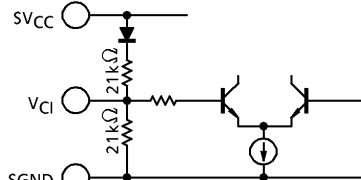
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BLOCK DIAGRAM



TERMINAL EXPLANATION

TERMINAL No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT
1	SV _{CC}	Supply terminal of small signal	
2	IN1	Input for CH1 • Not biased inside.	
3	PV _{CC} 1	Supply terminal of output stage for CH1 • Supply terminal of output stage are not connected to other channel terminal.	
4	OUT1 +	Non-inverted output for CH1	
5	OUT1 -	Inverted output for CH1	
FIN1	PGND	Power GND • Connected to FIN2 and substrate.	
6	OUT2 -	Inverted output for CH2	Same as CH1
7	OUT2 +	Non-inverted output for CH2	
8	PV _{CC} 2	Supply terminal of output stage for CH2	
9	IN2	Input for CH2	
10	V _{RI}	Input reference voltage • Under condition of $V_{R1} \leq 1.8V$, internal bias circuit is shut off.	
11	V _{CI}	Output reference voltage • $V_{OUT} = V_{CI} = (V_{CC} - V_F) / 2$	
12	IN3	Input for CH3	Same as CH1
13	PV _{CC} 3	Supply terminal of output stage for CH3	
14	OUT3 +	Non-inverted output for CH3	
15	OUT3 -	Inverted output for CH3	
FIN2	PGND	Power GND	Connected to FIN1
16	OUT4 -	Inverted output for CH4	Same as CH1
17	OUT4 +	Non-inverted output for CH4	
18	PV _{CC} 4	Supply terminal of output stage for CH4	
19	IN4	Input for CH4	
20	SGND	Small signal GND	

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	14	V
Power Dissipation	P _D (Note 1)	2 (Note 2)	W
Operating Temperature	T _{opr}	– 30~85	°C
Storage Temperature	T _{stg}	– 55~150	°C

(Note 1) : Mounted on 50mm × 50mm × 1.6mm size board with copper area 60% over.

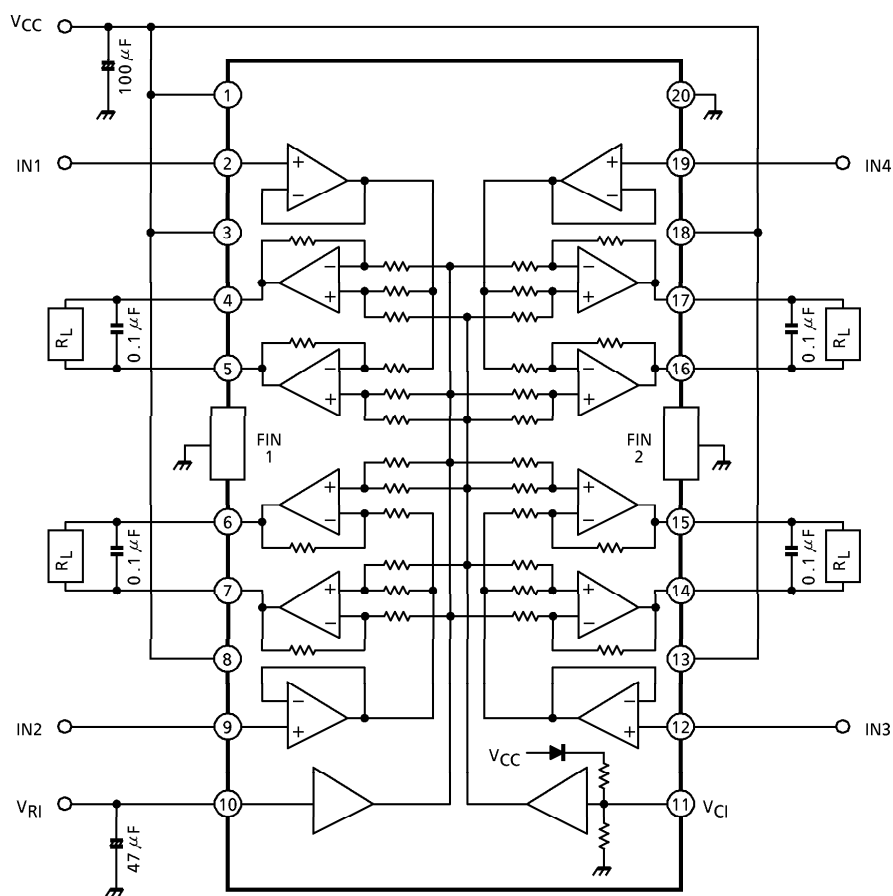
(Note 2) : Derated above Ta = 25°C, in the proportion of 62.5mW/°C.

ELECTRICAL CHARACTERISTICS

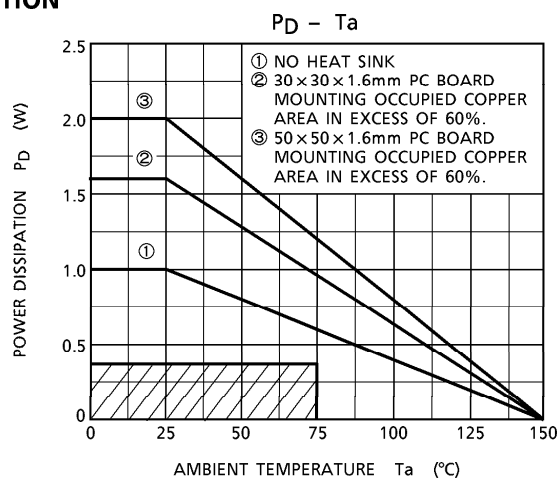
(Unless otherwise specified, V_{CC} = 5V, R_L = 5Ω, R_g = 620Ω, V_{RI} = 2.1V, f = 1kHz, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V _{CC}	—		4.0	—	10.0	V
Quiescent Current	I _{CCQ}	—	V _{in} = 0, R _L = OPEN	20	35	60	mA
Input Offset Current	I _{IN}	—	V _{IN} = 2.1V	—	250	800	nA
V _{RI} Terminal Offset Current	I _{I0}	—	V _{RI} = 2.1V	—	35	120	μA
Output Offset Voltage	V _O OS1	—	V _{CC} = 5V, R _g = 0Ω	– 30	—	30	mV
	V _O OS2	—	V _{CC} = 8V, R _g = 0Ω	– 50	—	50	
	V _O OS3	—	V _{CC} = 12V, R _g = 0Ω	– 100	—	100	
Reference Output Voltage	V _{OUT}	—		—	2.1	—	V
Maximum Output Voltage	V _{OM1}	—	V _{CC} = 5V	4.0	5.0	—	V _{p-p}
	V _{OM2}	—	V _{CC} = 6V	5.0	6.0	—	
Voltage Gain	G _v	—	V _{in} = 100mV _{rms}	14.5	15.5	16.5	dB
Frequency Response	f _c	—	V _{in} = 100mV _{rms}	—	100	—	kHz
Total Harmonic Distortion	THD	—	V _{in} = 100mV _{rms}	—	– 50	—	dB
Slew Rate	S.R.	—	V _{out} = 2V _{p-p}	—	1.0	—	V / μs
Cross Talk	C.T.	—	V _{out} = 1V _{rms}	—	– 60	—	dB
Ripple Rejection Ratio	R.R.	—	f _{rip} = 100Hz, V _{rip} = 100mV _{rms}	—	– 60	—	dB
Thermal Shut Down Temperature	T _{TSD}	—	Chip temperature	—	150	—	°C
V _{RI} ~GND Short Protection Voltage	V _{RI} OFF	—		1.4	1.6	1.8	V

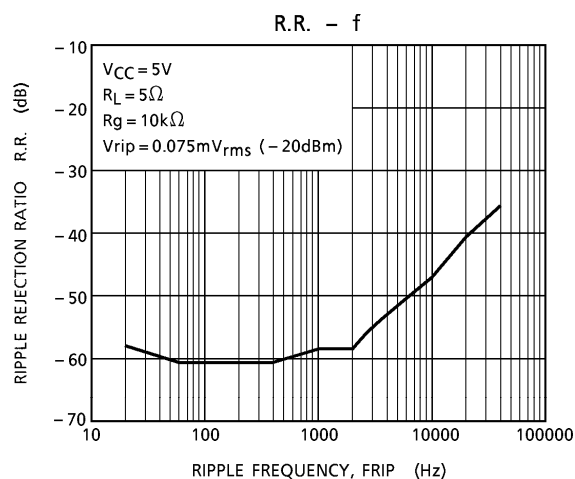
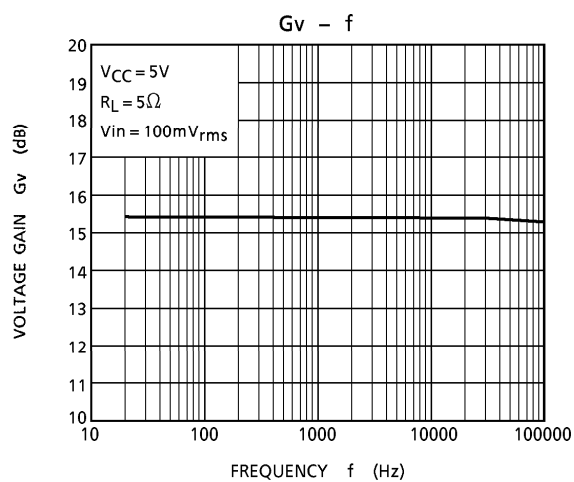
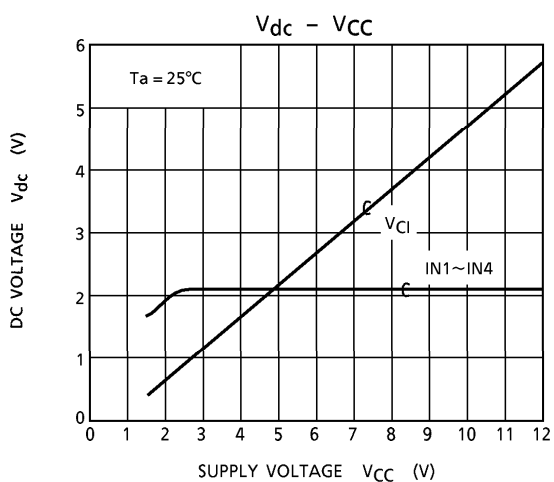
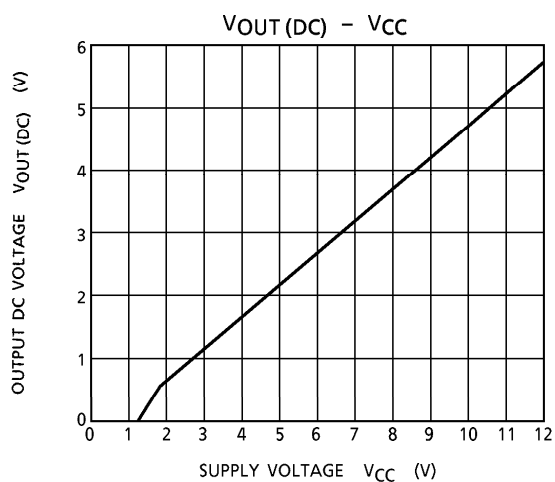
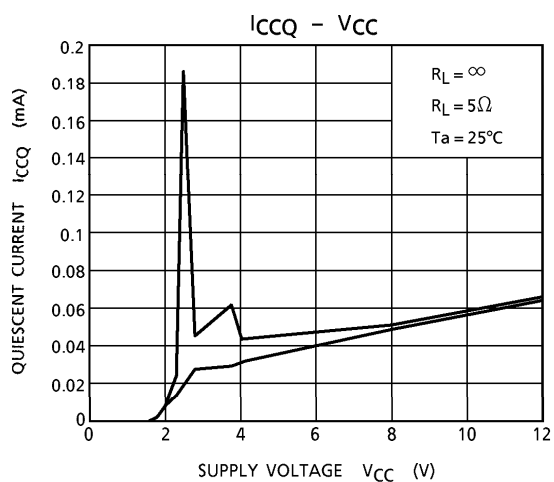
TEST CIRCUIT

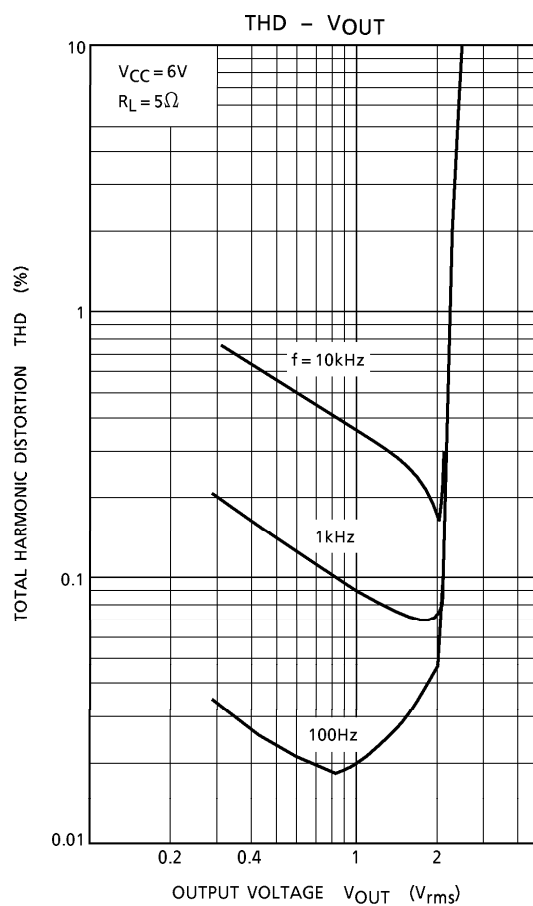
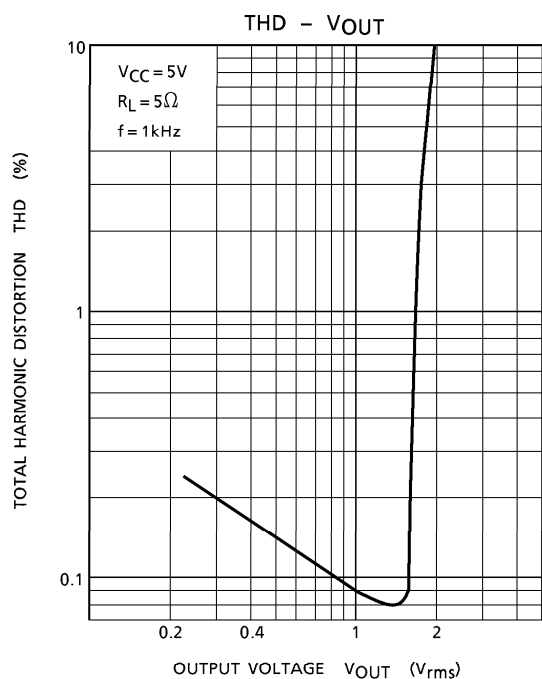


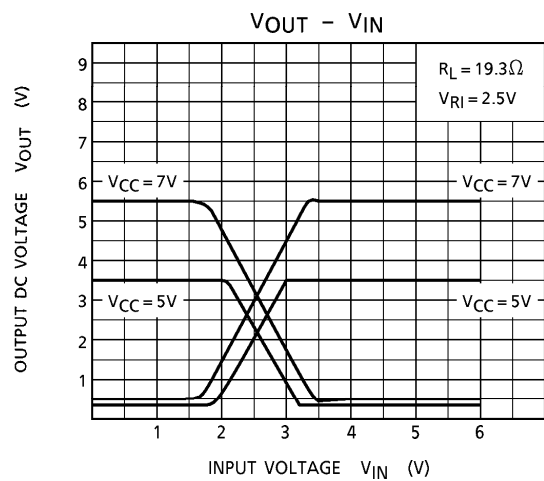
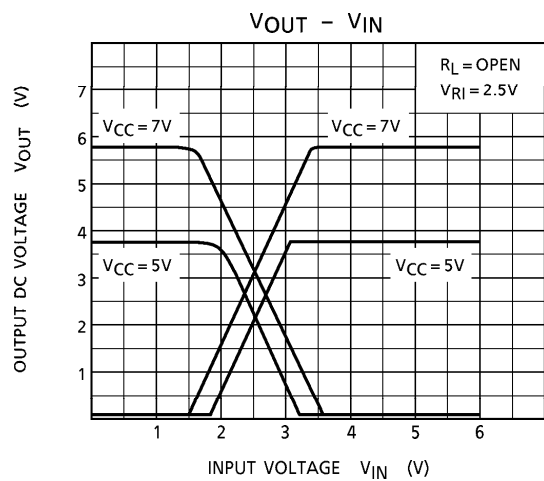
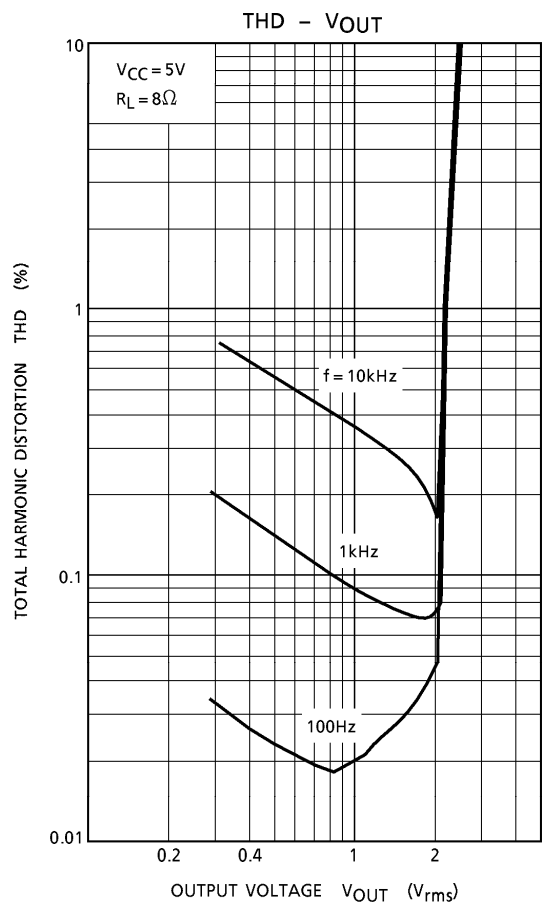
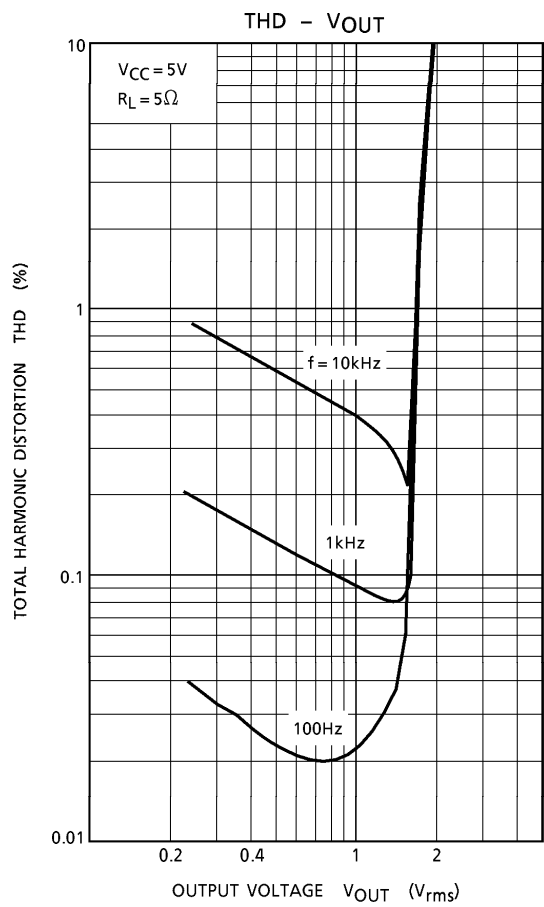
HSOP 20 POWER DISSIPATION

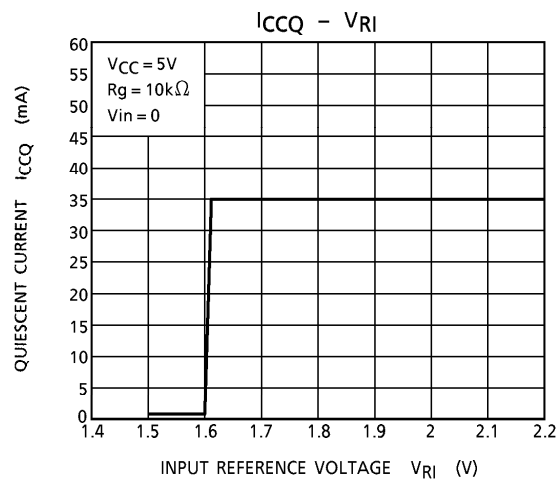
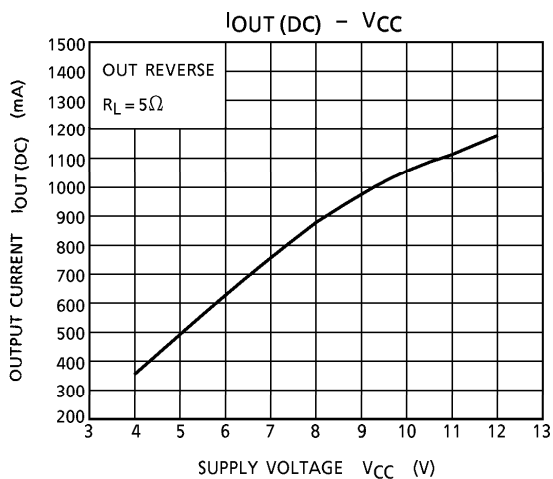
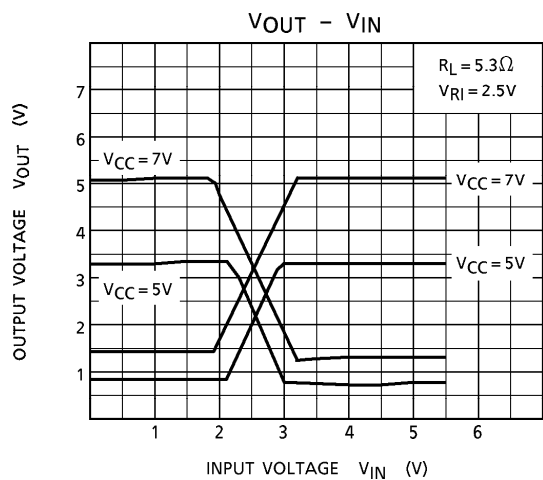
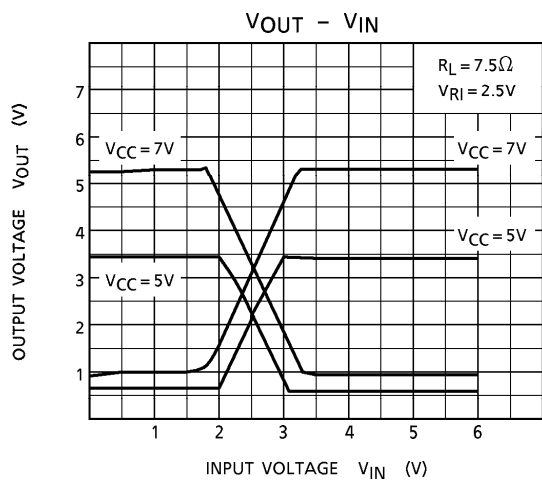


(Note) In case of normal use, power dissipation of IC only is oblique line portion.









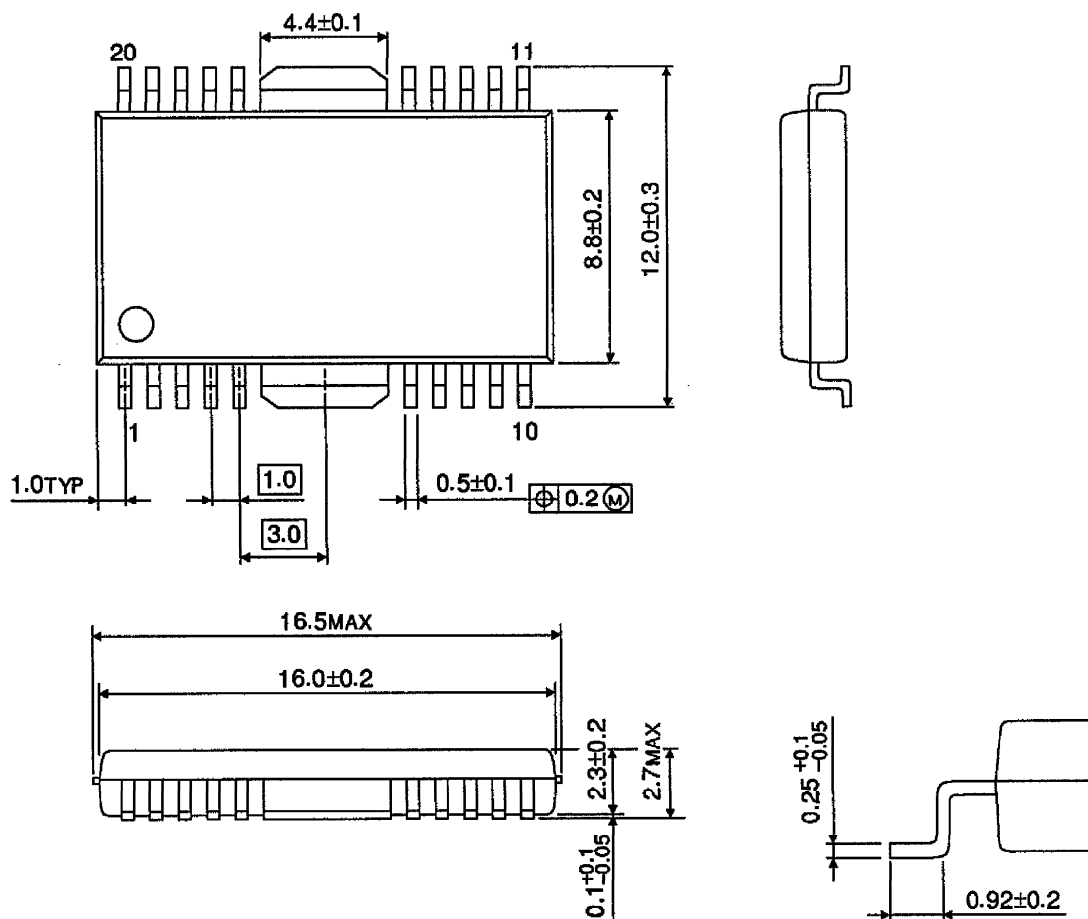
PRECAUTION USE

- Input Stage
 - Input stages are consisted of differential circuit of NPN Tr, and have built-in IB compensation circuit.
- Built-in Driver
 - Each channel driver consists of BTL configuration linear amplifier.
 - Voltage gain is fixed : $G_V = 15.5\text{dB}$ (Typ.)
 - Voltage loss for output stage is $2V_{BE} + V_{CE}(\text{sat})$ for positive cycle, $V_{CE}(\text{sat})$ for negative cycle, because of no-bootstrap circuit. So, output DC voltage is designed as less than $1/2V_{CC}$.
- V_{RI} Terminal
 - V_{RI} is reference voltage terminal for input signal.
 - If reference voltage from servo IC drop less than 1.8V, protection circuit operates and shut off bias circuit inside. This operation is to prevent load from moving undesirably in case of V_{RI} drop for accident or some reason.
- V_{CI} Terminal
 - Output DC voltage is determined by circuit of this terminal inside as ;
$$V_{CI} = V_{OUT}(\text{DC}) = (V_{CC} - V_F) / 2$$
 - Output signal dynamic range is depend on V_{CC} . On the other hand, input signal dynamic range is determined by V_{RI} as mentioned and voltage gain is fixed inside. So, maximum output voltage does not increase as V_{CC} increases.
 - Because of BTL configuration, Ripple Rejection Ratio does not improve not much when capacitor is connected to V_{CI} terminal to GND.
- GND
 - Large signal GND is for output stage and small signal GND is for stages from input circuit to pre-output stage.
 - These GND pins are not connected inside.
 - $\text{Phin}\textcircled{1}$ and $\text{Phin}\textcircled{2}$ are connected to Bedflame, and it is connected to substrate.
 - It is advised that you make a Printed Board layout of small signal GND and large signal GND should be isolated each other.
- Oscillation preventive capacitor
 - We recommend to use the capacitor of $0.1\mu\text{F}$, between each output terminals. But perform the temperature test to check the oscillation allowance, since the oscillation allowance is varied according to the causes described below.
 - 1) Supply voltage
 - 2) Ambient temperature
 - 3) Load impedance
 - 4) Capacity value of condenser
 - 5) Kind of condenser
 - 6) Layout of Printed board
- We recommend to connect Pass-condenser, which is about 10 to $100\mu\text{F}$ between V_{RI} terminal and GND.
- V_{CI} terminal is recommend to use "OPEN".

OUTLINE DRAWING

HSOP20-P-450-1.00

Unit : mm



Weight : 0.8g (Typ.)