

# M5266P

## LOW SATURATION OUTPUT TYPE CURRENT DRIVER

### DESCRIPTION

M5266P is quad Darlington current driver (semiconductor integrated circuit) which consists of NPN transistors with clamp diode and it can be driven directly by very small input current.

Low saturation output can be obtained by separating the output stage transistor's collector from the drive stage transistors.

### FEATURES

- High voltage resistance . . . . .  $BV_{CEO} \geq 80V$
  - High input voltage resistance . . . . .  $V_I \geq 20V$
  - Large current drive . . . . .  $I_{C(max)} = 2.0A^*$
  - Low saturation output . . . . .  $0.25V$  (typ) ( $I_C = 0.3A$ )
  - Contains a clamp diode.
  - Operates by the "H" level input.
  - Wide operating temperature range . . .  $T_a = -40 \sim +85^\circ C$
- \*  $PW = 10\text{ ms}$ , duty cycle  $\leq 10\%$

### APPLICATION

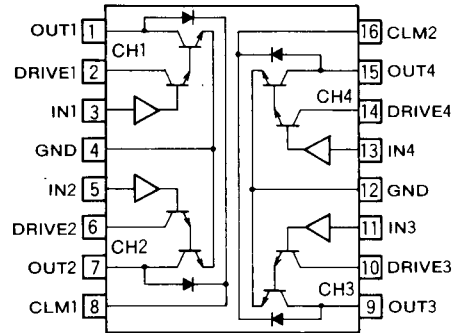
Motor drives for various relays or portable printers, digit drives for display elements such as LEDs and lamps, or power amplifiers

### FUNCTION

Unlike the existing common-collector-type transistor arrays, M5266P realizes  $0.25V$  of low saturation output voltage (typ,  $I_C = 0.3A$ ) by separating the drive stage collector from the output stage collector. Therefore, the power dissipation which is determined by the product of the load current and the saturation output voltage can be greatly decreased.

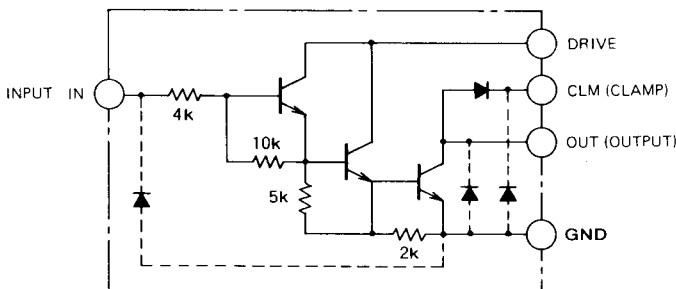
The maximum output current is  $2.0A$  and up to  $80V$  can be applied as the output voltage.

### PIN CONFIGURATION (TOP VIEW)



Outline 16P4

### CIRCUIT DIAGRAM



### HIGH ACTIVE

#### \* OUTPUT - FUNCTION

| Input | Output |
|-------|--------|
| L     | H(OFF) |
| H     | L(ON)  |

DRIVE, CLM,  $V_{CC}$ , and GND are common to channels 1-2 and 3-4.  
The diode indicated by dashed lines are already contained in the IC structure, therefore, it is not necessary to attach it externally.

Unit:  $\Omega$

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**ABSOLUTE MAXIMUM RATINGS** (Ta=25℃, unless otherwise noted)

| Symbol | Parameter                   | Conditions                                 | Ratings     | Unit |
|--------|-----------------------------|--------------------------------------------|-------------|------|
| VD     | Drive stage applied voltage |                                            | 80          | V    |
| VCE0   | Output voltage              | When the output is "H"                     | 80          | V    |
| VI     | Input voltage               |                                            | 20          | V    |
| IC     | Output current              | Current per circuit when the output is "L" | 2.0 *       | A    |
| VR     | Clamp diode reverse voltage |                                            | 80          | V    |
| IF     | Clamp diode forward current |                                            | 2.0         | A    |
| Pd     | Power dissipation           | Ta=25℃                                     | 2.0(2.5) ** | W    |
| Topr   | Operating temperature       |                                            | -40 ~ +85   | ℃    |
| Tstg   | Storage temperature         |                                            | -55 ~ +150  | ℃    |

\* : PW = 10ms, duty cycle ≤ 10%

\*\* : 400mm<sup>2</sup> of copper film is added.

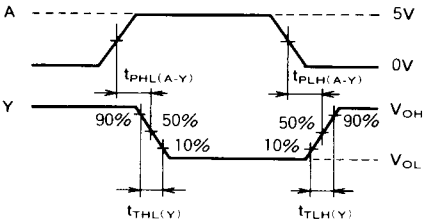
**RECOMMENDED OPERATING CONDITIONS** (Ta=25℃, unless otherwise noted)

| Symbol | Parameter                   | Conditions          | Limits |     |      | Unit |
|--------|-----------------------------|---------------------|--------|-----|------|------|
|        |                             |                     | Min    | Typ | Max  |      |
| VD     | Drive stage applied voltage |                     | 4      | 5   | 70   | V    |
| VCE    | Output applied voltage      |                     | 0      |     | 70   | V    |
| IC     | Output current              | Current per circuit | 0      | 0.3 | 1.25 | A    |
| VR     | Clamp diode reverse voltage |                     | 0      |     | 70   | V    |
| IF     | Clamp diode forward current |                     | 0      |     | 1.25 | A    |
| Pd     | Operating temperature       |                     | 0      |     | 1.0  | W    |

**ELECTRICAL CHARACTERISTICS** (Ta=25℃, value/circuit unless otherwise noted)

| Symbol   | Parameter                   | Test conditions      |                      | Limits |      |     | Unit |
|----------|-----------------------------|----------------------|----------------------|--------|------|-----|------|
|          |                             |                      |                      | Min    | Typ  | Max |      |
| V(BR)CEO | Output breakdown voltage    | ICE0 = 100μA         |                      | 80     |      |     | V    |
| VCE(sat) | Saturation output voltage   | VD = 4V<br>VI = 3.5V | IC = 1.25A, RD = 50Ω |        | 1.0  | 1.8 | V    |
|          |                             |                      | IC = 0.7A, RD = 100Ω |        | 0.55 | 1.0 |      |
|          |                             |                      | IC = 0.3A, RD = 260Ω |        | 0.25 | 0.5 |      |
| II       | Input current               | VI = 4V              |                      |        |      | 1.0 | mA   |
|          |                             | VI = 0.5V            |                      |        |      | 0.1 |      |
| IO(leak) | Output lead current         | VCE = 80V            |                      |        |      | 100 | μA   |
| IR       | Clamp diode leak current    | VR = 80V             |                      |        |      | 50  | μA   |
| VR       | Clamp diode reverse voltage | IR = 100μA           |                      | 80     |      |     | V    |
| VF       | Clamp diode forward voltage | IF = 1.25A           |                      |        |      | 2.5 | V    |
| VIH      | "H" input voltage           | IC = 1.25A           |                      | 3.5    |      |     | V    |
| VIL      | "L" input voltage           | IO(leak) = 50μA      |                      |        |      | 1.0 | V    |

**TIMING DIAGRAM**

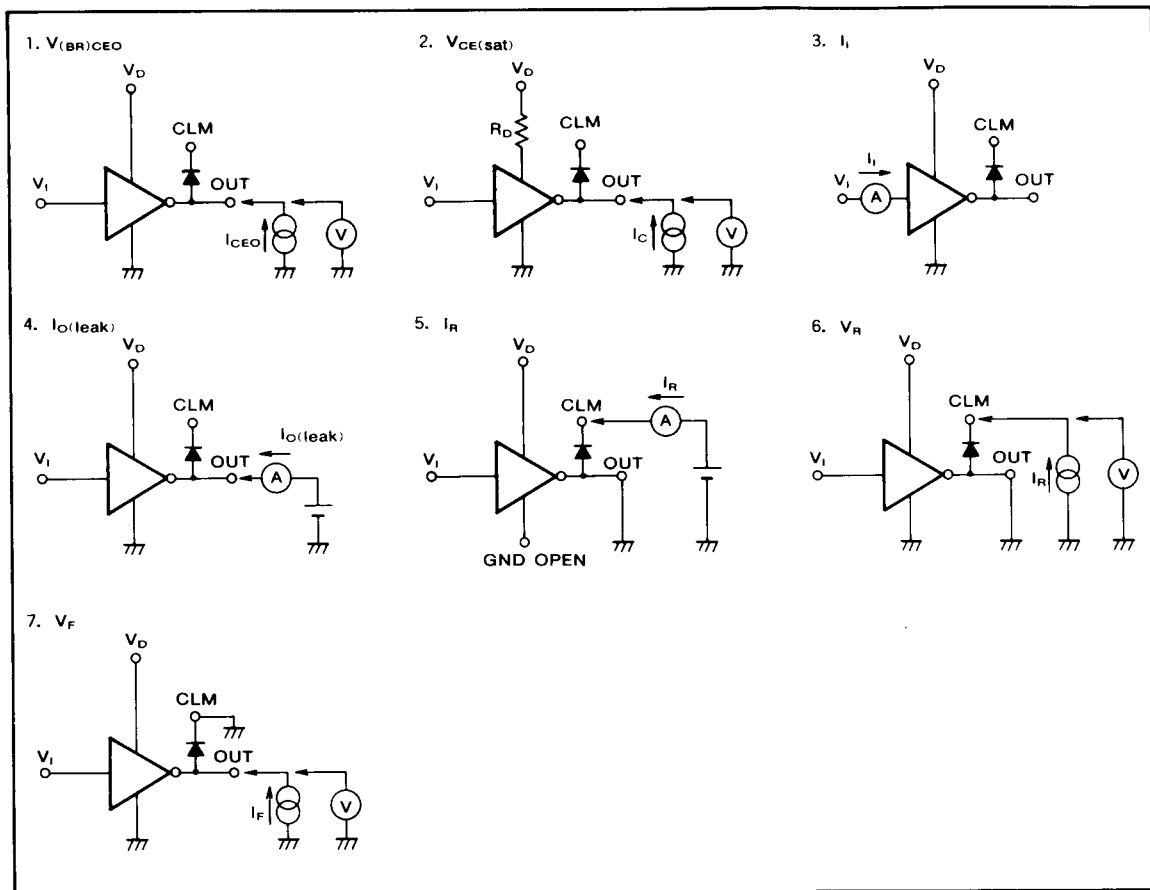


**TYPICAL SPEED (Example)**

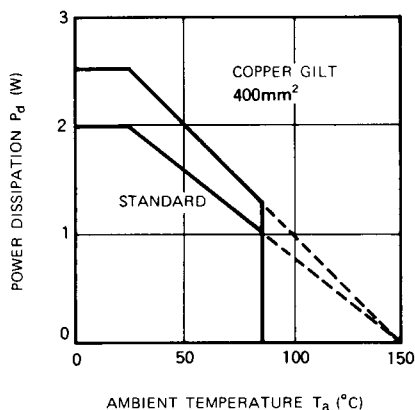
|                       |                       |                     |                     |
|-----------------------|-----------------------|---------------------|---------------------|
| t <sub>PHL(A-Y)</sub> | t <sub>PLH(A-Y)</sub> | t <sub>THL(Y)</sub> | t <sub>TLH(Y)</sub> |
| 40ns                  | 2.0μs                 | 200ns               | 500ns               |

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**TEST CIRCUITS**

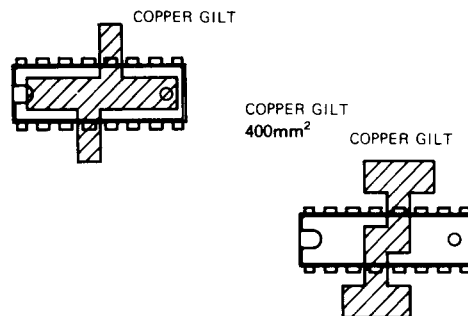


**TYPICAL CHARACTERISTICS**



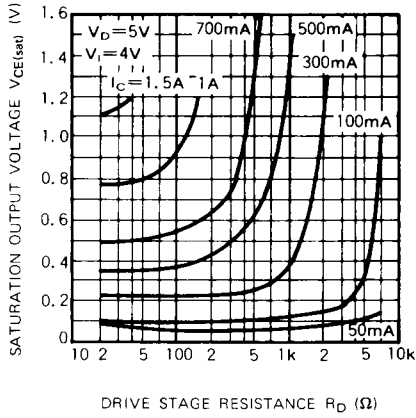
**SAMPLE PCB LAYOUT**

When you design a layout of a PCB, you have to consider the thermal derating. To improve the heat radiation of an IC, add a 400 mm<sup>2</sup> of copper film at the base of the GND pin. This will improve the thermal derating characteristics.

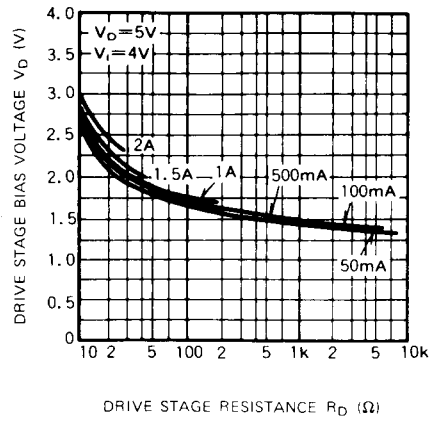


**LOW SATURATION OUTPUT TYPE CURRENT DRIVER**

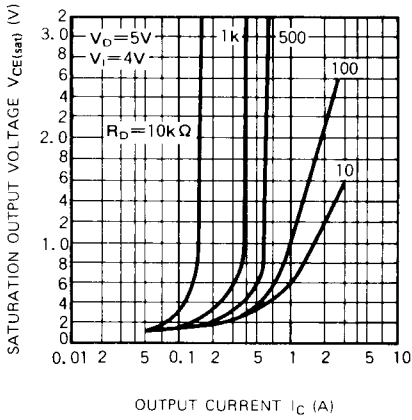
**SATURATION OUTPUT VOLTAGE  
VS. DRIVE STAGE RESISTANCE**



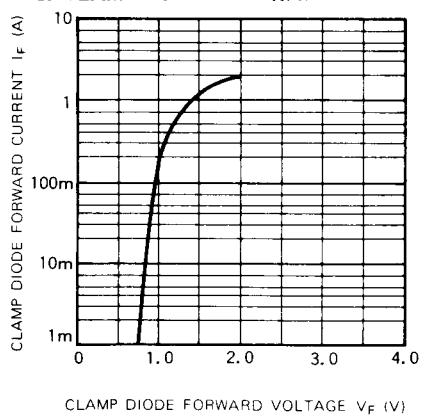
**DRIVE STAGE VIAS VOLTAGE  
VS. DRIVE STAGE RESISTANCE**



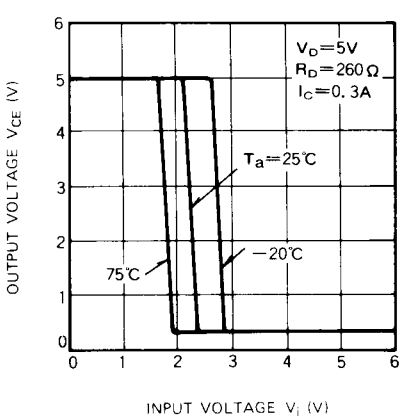
**SATURATION OUTPUT VOLTAGE  
VS. OUTPUT CURRENT**



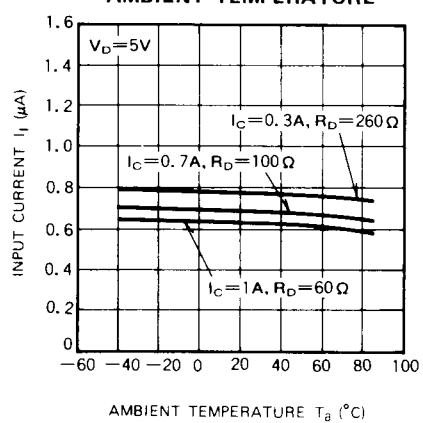
**CLAMP DIODE FORWARD CURRENT  
VS. CLAMP DIODE FORWARD VOLTAGE**



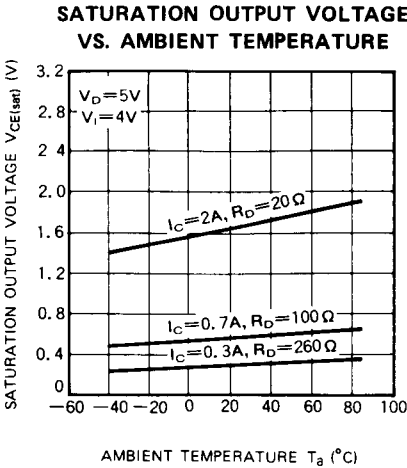
**OUTPUT VOLTAGE  
VS. INPUT VOLTAGE**



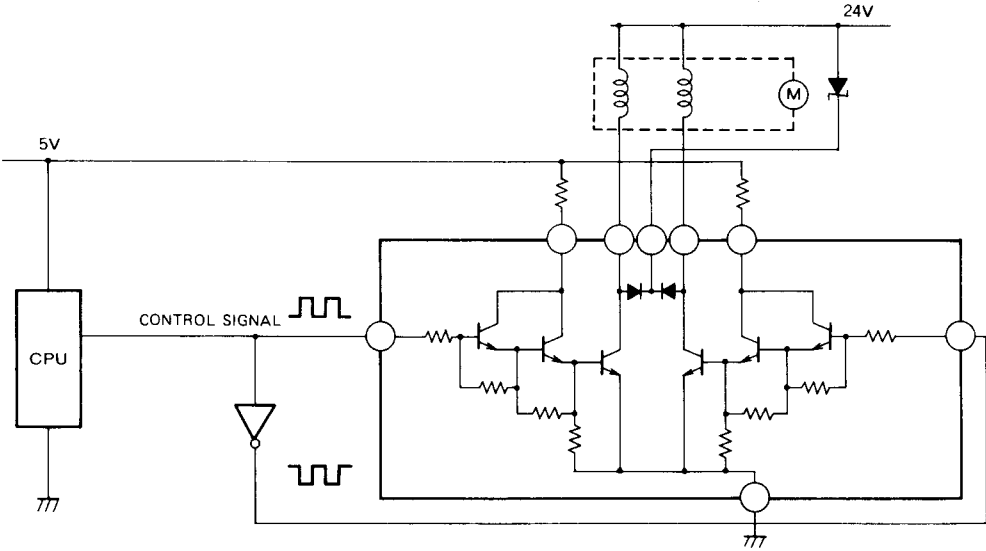
**INPUT CURRENT VS.  
AMBIENT TEMPERATURE**



LOW SATURATION OUTPUT TYPE CURRENT DRIVER



APPLICATION CIRCUIT (Stepping motor drive for a printer)



CLAMP, GND ARE THE SAME FOR BOTH CIRCUITS.