

M5269L**LOW SATURATION OUTPUT TYPE CURRENT DRIVER****DESCRIPTION**

M5269L is dual Darlington current driver (semiconductor integrated circuit) which consists of PNP and NPN transistors with clamp diode and it can be driven directly from 5V-type microcomputers or logic ICs.

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 $0.3V$ (typ) ($I_C = 0.7A$)
- Contains a clamp diode.
- Operates by the "L" level input.
- Wide operating temperature range . . . $T_a = -40^\circ C \sim +85^\circ C$
* $PW = 10$ ms, duty cycle $\leq 10\%$

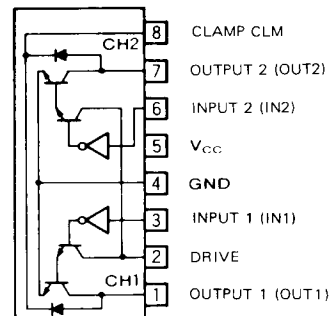
APPLICATION

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

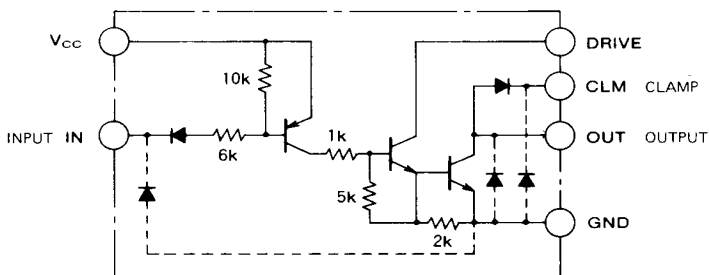
FUNCTION

Unlike the existing common-collector-type transistor arrays, M5269L realizes $0.3V$ of low saturation output voltage (typ, $I_C = 0.7A$) 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 $3.0A$ and up to $80V$ can be applied as the output voltage.

PIN CONFIGURATION (TOP VIEW)

Outline 8P5

CIRCUIT DIAGRAM**LOW ACTIVE**

* Output - Function

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

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

UNIT: Ω

LOW SATURATION OUTPUT TYPE CURRENT DRIVER

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage		20	V
V_D	Drive stage applied voltage		80	V
V_{CED}	Output voltage	When the output is "H"	80	V
V_I	Input voltage	$V_{CC} = 5\text{V}$	30	V
I_C	Output current	Current per circuit when the output is "L"	3.0*	A
V_R	Clamp diode reverse voltage		80	V
I_F	Clamp diode forward current		3.0	A
P_d	Power dissipation	$T_a = 25^\circ\text{C}$	1, 2(1, 7)**	W
T_{opr}	Operating temperature		$-40 \sim +85$	$^\circ\text{C}$
T_{stg}	Storage temperature		$-55 \sim +150$	$^\circ\text{C}$

* : $PW = 10\text{ms}$, duty cycle $\leq 10\%$

** : 400mm² of copper film is added.

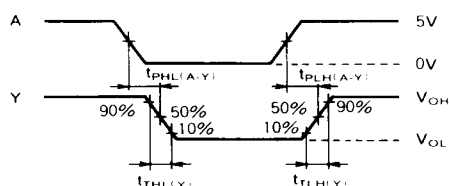
RECOMMENDED OPERATING CONDITIONS ($T_a = 25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		4	5	6	V
V_D	Drive stage applied voltage		4	5	70	V
V_{CE}	Output applied voltage		0		70	V
I_C	Output current	Current per circuit	0	0.7	2.0	A
V_R	Clamp diode reverse voltage		0		70	V
I_F	Clamp diode forward current		0		2.0	A
P_d	Operating temperature		0		1, 0	W

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, value/circuit unless specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)CEO}$	Output breakdown voltage	$I_{CEO} = 100\mu\text{A}$	80			V
I_{CCH}	Output "H" supply voltage	$V_{CC} = 6\text{V}$, $V_I = V_{CC}$			10	μA
I_{CCL}	Output "L" supply voltage	$V_{CC} = 6\text{V}$, $V_I = 0.5\text{V}$			10	mA
$V_{CE(sat)}$	Saturation output voltage	$V_{CC} = 4\text{V}$ $V_D = 4\text{V}$ $V_I = 0.5\text{V}$		0.8	1.5	V
		$I_C = 1.8\text{A}$, $R_D = 30\Omega$		0.4	0.8	
		$I_C = 1.0\text{A}$, $R_D = 50\Omega$		0.3	0.6	
I_I	Input current	$V_I = V_{CC} - 0.5\text{V}$			-0.1	mA
		$V_I = V_{CC} - 6\text{V}$			-0.1	
$I_{O(leak)}$	Output lead current	$V_{CE} = 80\text{V}$			100	μA
I_R	Clamp diode leak current	$V_R = 80\text{V}$			50	μA
V_R	Clamp diode reverse voltage	$I_R = 100\mu\text{A}$	80			V
V_F	Clamp diode forward voltage	$I_F = 2.0\text{A}$			3.0	V
V_{IH}	"H" input voltage	$I_{O(leak)} = 50\mu\text{A}$	$V_{CC} - 1.0$			V
V_{IL}	"L" input voltage	$I_C = 2.0\text{A}$			$V_{CC} - 3.5$	V

TIMING DIAGRAM

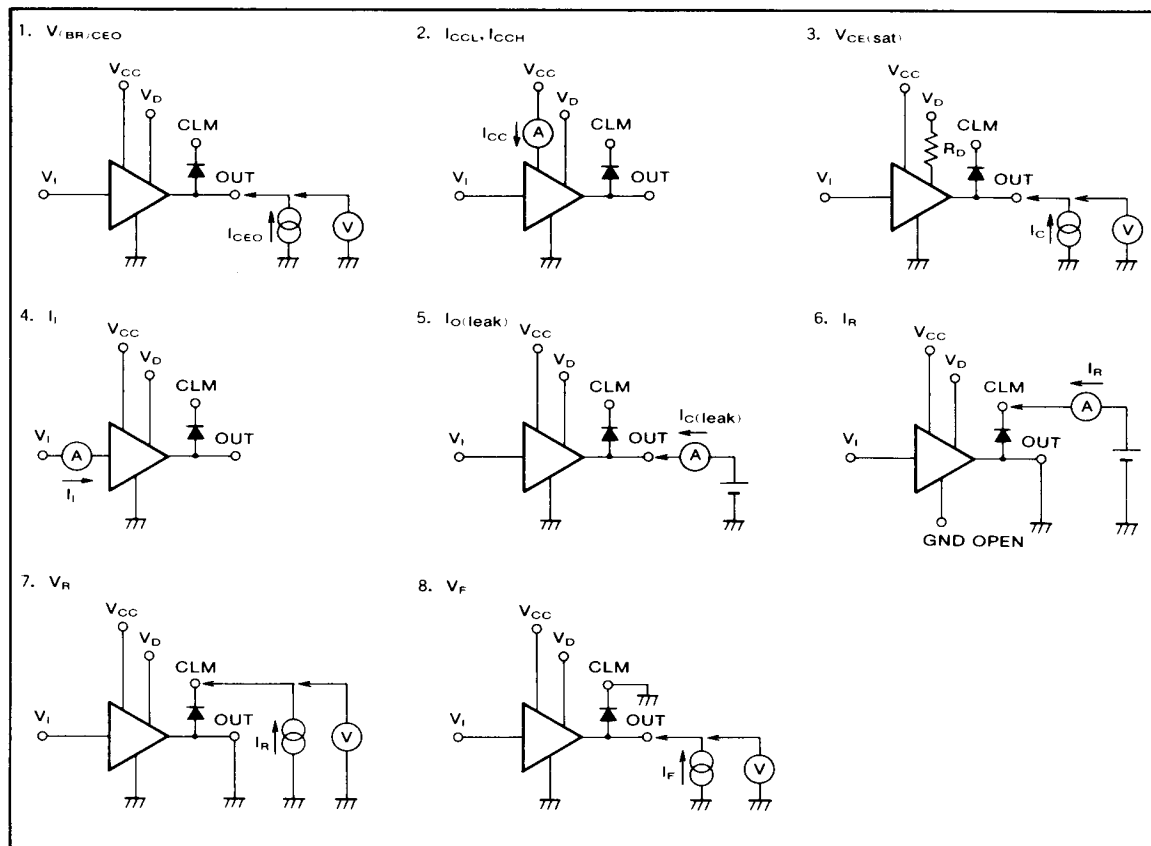


TYPICAL SPEED (Example)

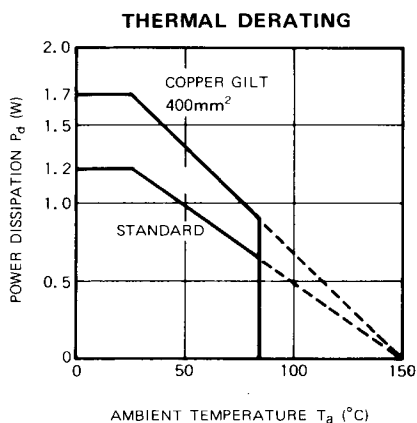
$t_{PHL(A-Y)}$	$t_{PLH(A-Y)}$	$t_{THL(Y)}$	$t_{TLH(Y)}$
500ns	11 μs	130ns	20ns

LOW SATURATION OUTPUT TYPE CURRENT DRIVER

TEST CIRCUITS

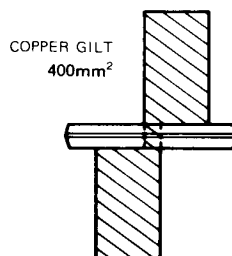


TYPICAL CHARACTERISTICS



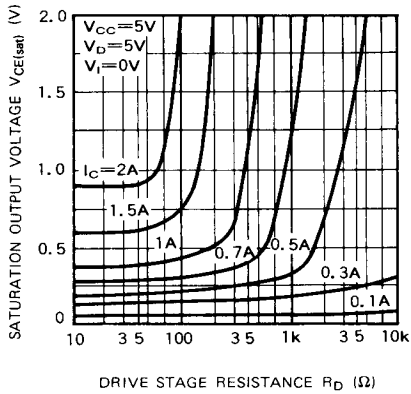
SAMPLE PCB LAYOUT

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 mm² of copper film at the base of the GND pin. This will improve the thermal derating characteristics.

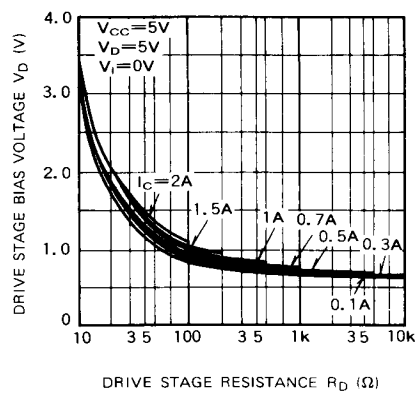


LOW SATURATION OUTPUT TYPE CURRENT DRIVER

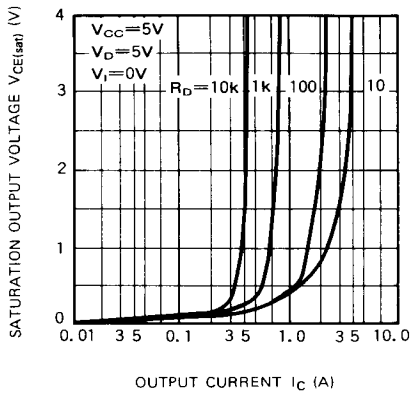
**SATURATION OUTPUT VOLTAGE
VS. DRIVE STAGE RESISTANCE**



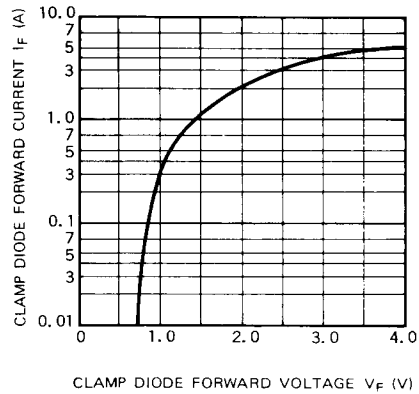
**DRIVE STAGE BIAS VOLTAGE
VS. DRIVE STAGE RESISTANCE**



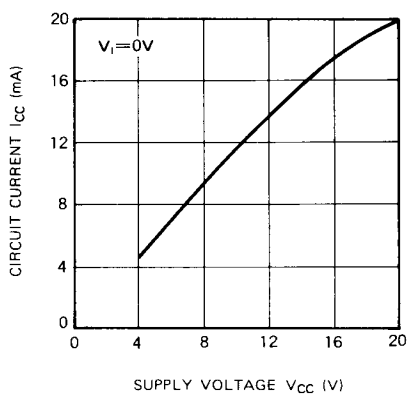
**SATURATION OUTPUT VOLTAGE
VS. OUTPUT CURRENT**



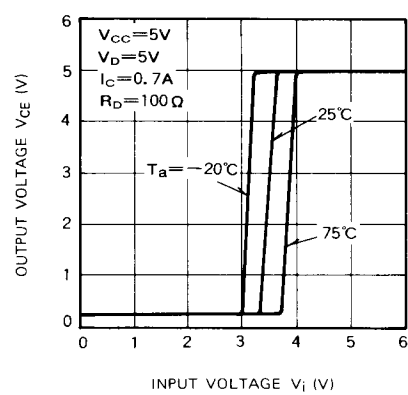
**CLAMP DIODE FORWARD CURRENT
VS. CLAMP DIODE FORWARD VOLTAGE**



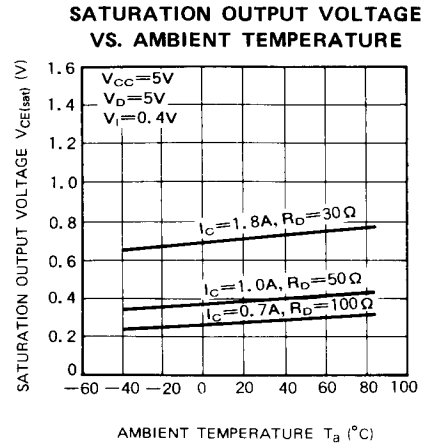
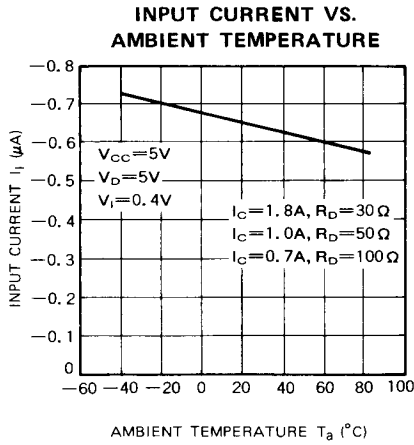
**CIRCUIT CURRENT
VS. SUPPLY VOLTAGE**



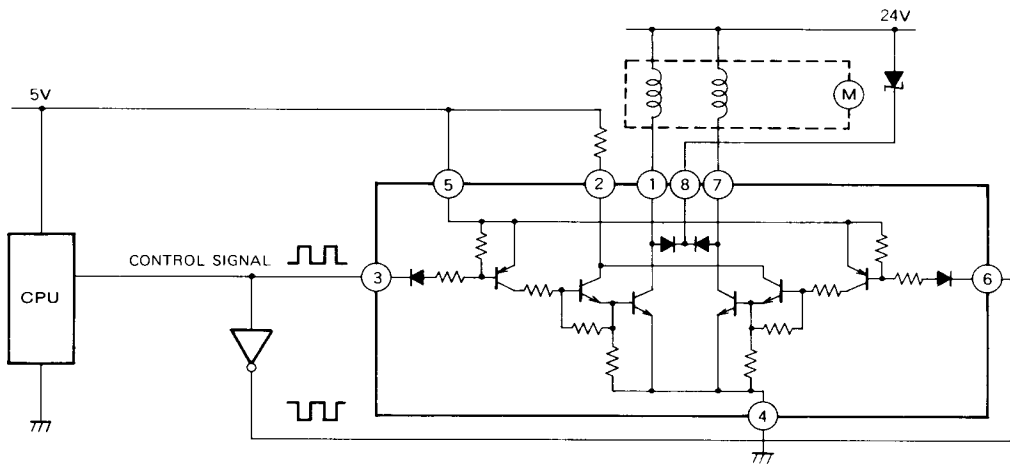
**OUTPUT VOLTAGE
VS. INPUT VOLTAGE**



LOW SATURATION OUTPUT TYPE CURRENT DRIVER



APPLICATION CIRCUIT (Stepping motor drive for a printer)



V_{CC} , DRIVE, CLAMP, AND GND ARE THE SAME FOR BOTH CIRCUITS.