MCH2890R

DUAL POWER DRIVER

Advance Information

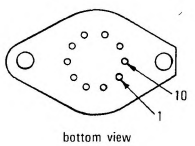
HYBRID DUAL POWER DRIVER

The MCH2890 Dual Power Driver is capable of driving a wide variety of inductive and resistive loads; included are hammer solenoids in high-speed digital printers, relays, lamps, paper-tape punches, and stepper motors in computer-operated plotters.

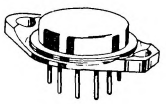
- High Current – to 6.0 Amperes
- High Breakdown Voltage – BV_{CEX} = 120 Volts min
- MTTL Compatibility
- Separate Integrated Circuit and Darlington Power Grounds
- Low V_{sat} at 3.0 and 6.0 Amperes
- Low Leakage Current – 0.1 μA typ

DUAL POWER DRIVER

HYBRID SILICON INTEGRATED CIRCUIT



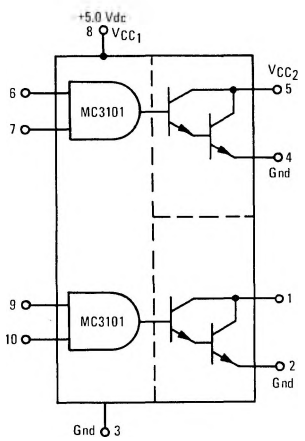
bottom view



CASE 685
METAL PACKAGE

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

Rating	Symbol	Value	Unit
Collector Current	I_C		A
Peak		8.0	
Continuous		1.0	
Collector Emitter Breakdown Voltage Minimum at $I_C \leq 0.5$ mA	BV_{CEX} (pins 1, 5)	120	Vdc
Power Supply Voltage (Integrated Circuit)	V_{CC1}	7.0	Vdc
Power Dissipation and Thermal Characteristics			
T_A = 25°C	P_D	3.75	Watts
Derate above T_A = 25°C	$1/\theta JA$	25	mW/°C
Thermal Resistance, Junction to Air	θ JA	40	°C/W
T_C = 25°C	P_D	25	Watts
Derate above T_C = 25°C	$1/\theta$ JC	167	mW/°C
Thermal Resistance, Junction to Case	θ JC	6.0	°C/W
Operating Temperature Range	T_A	0 to +70	°C
Storage Temperature Range	T_{stg}	-55 to +175	°C

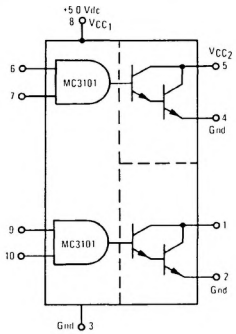


This is advance information on a new introduction and specifications are subject to change without notice.

See Packaging Information Section for outline dimensions.

ELECTRICAL CHARACTERISTICS

Test procedures are shown for only one power driver. The other power driver is tested in the same manner.



TEST CURRENT/VOLTAGE VALUES

	AMPERES		mA			VOLTS								
	I_{OL1}	I_{OL2}	I_{in}	I_D	$I_{C(max)}$	V_{IH}	V_{IL}	V_F	V_R	V_{CC1}	V_{CC2}	V_{CCIL}	V_{CCIH}	V_{RH}
0°C	–	–	–	–	–	2.0	–	0.4	–	5.0	–	4.5	5.5	4.0
+25°C	3.0	6.0	1.0	−10	0.5	1.8	1.1	0.4	2.4	5.0	90	4.5	5.5	4.0
+75°C	–	–	–	–	–	1.8	–	0.4	–	5.0	–	4.5	5.5	4.0

Characteristics	Symbol	Pin Under Test	TEST LIMITS 0°C Min	0°C Max	+25°C Min	+25°C Typ	+25°C Max	+75°C Min	+75°C Max	Unit	TEST CURRENT/VOLTAGE APPLIED TO PINS LISTED BELOW: I_{OL1}	I_{OL2}	I_{in}	I_D	$I_{C(max)}$	V_{IH}	V_{IL}	V_F	V_R	V_{CC1}	V_{CC2}	V_{CCIL}	V_{CCIH}	V_{RH}	GND
Input Forward Current	I_F	6	–	−2.0	–	–	−2.0	–	−2.0	mAdc	–	–	–	–	–	–	–	6	–	–	–	8	–	7	2,3,4
Input Leakage Current	I_R	6	–	50	–	–	50	–	50	μAdc	–	–	–	–	–	–	–	–	6	–	–	–	8	–	2,3,4,7
Input Breakdown Voltage	BV_{in}	6	–	–	5.5	–	–	–	–	Vdc	–	–	6	–	–	–	–	–	–	–	–	–	8	–	2,3,4,7
Input Clamp Voltage	V_D	6	–	–	–	–	−1.5	–	–	Vdc	–	–	–	6	–	–	–	–	–	–	–	8	–	–	2,3,4
Output Voltage (See Figure 1)	V_{OL1}	5	–	–	–	–	1.5	–	–	Vdc	5	–	–	–	–	6	–	–	–	–	–	–	–	7	2,3,4
	V_{OL2}	5	–	–	–	–	2.5	–	–		–	5	–	–	–	4	–	–	–	–	–	–	–	7	2,3,4
	BV_{CEX}	5	–	–	120	–	–	–	–		–	–	–	–	5	–	–	6	–	–	–	–	–	7	2,3,4
Output Leakage Current	I_{CEX}	5	–	–	–	0.1	–	–	–	μAdc	–	–	–	–	–	–	6	–	–	–	5	–	–	7	2,3,4
Output Power Supply Drain Current	I_{PDL}	8	–	–	–	–	30	–	–	mAdc	–	–	–	–	–	–	–	–	–	8	–	–	–	–	2,3,4,6, 7,9,10
Output Power Supply Drain Current	I_{PDH}	8	–	–	–	–	120	–	–	mAdc	–	–	–	–	–	–	–	–	–	8	–	–	–	6,7,9, 10	2,3,4
Switching Parameters (See Figure 2)													Pulse In	Pulse Out											
Turn-On Delay Time	t_{pd^-}	5,6	–	–	–	0.26	–	–	–	μs	5	–	6	5	–	–	–	–	–	8	5	–	–	7	2,3,4
Turn-Off Delay Time	t_{pd^+}	5,6	–	–	–	1.8	–	–	–	μs	5	–	6	5	–	–	–	–	–	8	5	–	–	7	2,3,4

TEST CIRCUITS

FIGURE 1 – V_{OL} TEST CIRCUIT

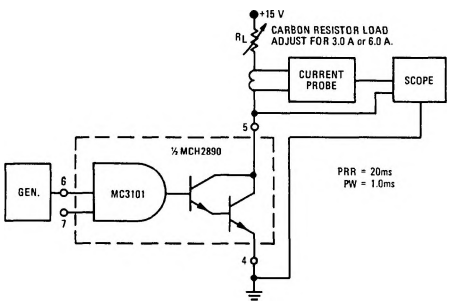
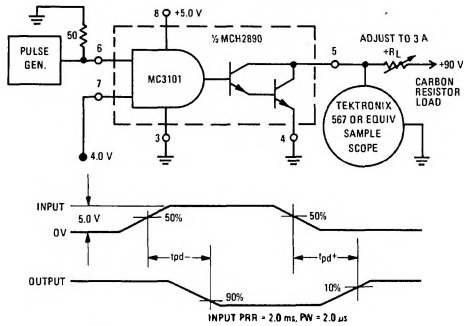


FIGURE 2 – PROPAGATION DELAY TIME TEST CIRCUIT



TYPICAL CHARACTERISTICS

FIGURE 3 – COLLECTOR-EMITTER VOLTAGE versus NEGATIVE EMITTER VOLTAGE

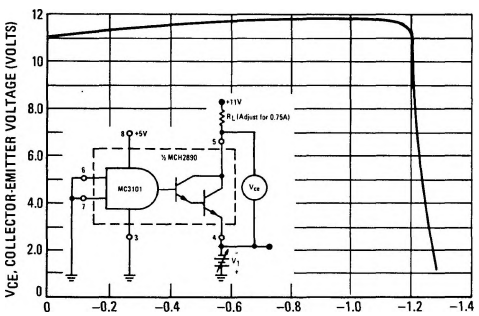
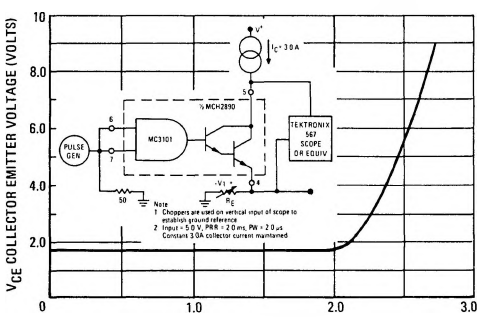


FIGURE 4 – COLLECTOR-EMITTER VOLTAGE versus POSITIVE EMITTER VOLTAGE



SAFE OPERATING AREA

FIGURE 5 – COLLECTOR-EMITTER VOLTAGE versus COLLECTOR CURRENT

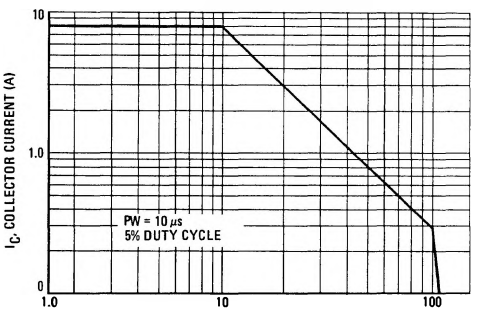
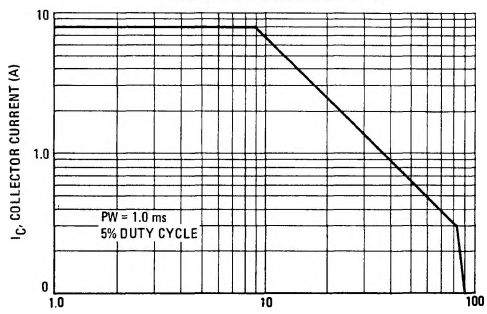
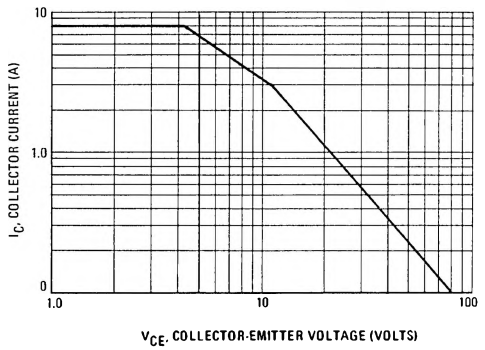


FIGURE 6 – COLLECTOR-EMITTER VOLTAGE versus COLLECTOR CURRENT



SAFE OPERATING AREA (Continued)

FIGURE 7 – COLLECTOR-EMITTER VOLTAGE versus COLLECTOR CURRENT



APPLICATIONS INFORMATION

The MCH2890 is designed for high-current and high-voltage applications such as hammer-drivers in high-speed printers, relay-drivers, lamp drivers, paper tape punches, stepping motors, and other high current inductive and resistive loads.

This dual hybrid driver, which consists of a monolithic MTTL "AND" gate and two power Darlington drivers, is capable of supplying up to 6.0 amperes at a maximum duty cycle of 10% with pulse widths up to 25 ms. In addition to the high-current drive capability the MCH2890 offers high collector-to-emitter breakdown (BV_{CEX} = 120 Volts min) which is desirable when driving inductive loads at high currents.

A typical high-speed hammer driver application is illustrated in Figure 8. The number of drivers per printer is large, and considerable electrical noise is generated when they are switched simultaneously. The ground line, which terminates all of the Darlington power drivers, may be several feet in length resulting in substantial inductance and series resistance. The effect of this inductance and resistance becomes appreciable at the high-current levels required of hammer drivers. When the Darlington power drivers are switched "off", even a small inductance at the Darlington ground generates a negative voltage spike which tends to turn the Darlington power driver "on" rather than "off". This negative excursion of the emitter can result in oscillations. The oscillation can be stopped by tieing the integrated circuit ground (pin 3) to the Darlington ground (pins 2 and 4) with as short a line as possible. (See Figure 8). This circuit configuration pulls the gate output lower when the negative spike is present on the power ground line which guarantees "turn off" of the Darlington power driver.

To insure that the Darlington power driver does not go into secondary breakdown and latch up, a diode clamp is employed as shown. For high-speed printers, the addition of a zener diode can aid in dissipating the stored inductive power (during "turn off") in the hammer solenoid.

Additional features of the MCH2890 include fast switching and low leakage for minimum standby power.

FIGURE 8 – TYPICAL HAMMER DRIVER APPLICATION