DIONICS INC.
65 RUSHMORE ST., WESTBURY, N.Y. 11590 (516) 997-7474

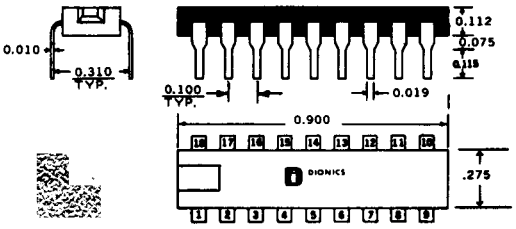
MONOLITHIC HIGH VOLTAGE
CONSTANT CURRENT 8 SEGMENT CATHODE DRIVERS AND 8 DIGIT LEVEL SHIFTERS

DI 298N
DI 288N
DI 278N
DI 268N
DI 258N
DI248N

DESIGN FEATURES

- *High Voltage Capability*
- *Externally Programable Current Levels*
- *Matched Output Currents*
- *TTL or MOS Drive Compatability*
- *Current Dimming Capability*
- *Short Circuit Proof*

PHYSICAL DIMENSIONS



18 PIN
DUAL INLINE PACKAGE

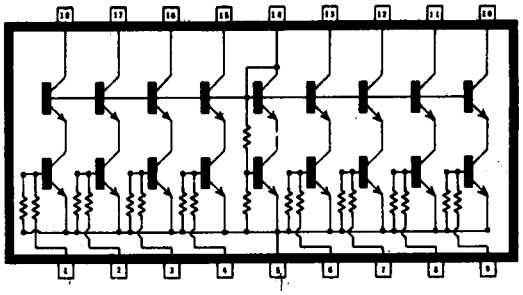
The DI 298N series of cathode drivers and the DI 258N series of level shifters are high voltage, dielectrically isolated monolithic circuits designed for driving gas discharge display panels at matched constant current levels.

Circuit operation of both the cathode driver and level shifter are identical with exception to operating voltage. The 125 volt rating of the DI 298N is adequate for driving the cathodes of most gas discharge displays, while the operating voltage of the level shifter will be dependent upon the value of the high voltage power supply being used.

Each circuit contains eight switched, constant current sources, the outputs of which are programmed by one external resistor. This resistor may be a pre-selected fixed value for general usage or may be partially variable in the case of the cathode driver, where dimming control of the display being driven is desired.

All eight output currents are matched to ensure equal brightness of each segment of the display being controlled.

CIRCUIT DIAGRAM



DI 248N 250V

MAXIMUM RATED VOLTAGE	225 VOLTS	200 VOLTS	175 VOLTS	150 VOLTS	125 VOLTS
NPN	DI 258N	DI 268N	DI 278N	DI 288N	DI 298N

ABSOLUTE MAXIMUM RATINGS

SYMBOL	CHARACTERISTIC	CONDITION	MAXIMUM LIMIT	UNIT
V_{IN}	Base input voltage	Switch inputs to common	6.0	Volts
I_O	Output Current	Per Line	2.0	MA
I_{R-IN}	Input Reverse Current	V_{R-IN} = 5.0V	500 per line	μA
I_{R-OUT}	Output Leakage Current	All inputs off VD = Max rated	1.0 per line	μA
ΔI_O	Output Current Matching	I_O = 1.0 MA	± 10	%
ΔI_O	Output Current Matching	I_O = 0.5 MA	± 10	%
T-PD	Total Power Dissipation	@ 25°c Ambient (See figure 5)	1.0	Watt
PD.	Instantanious Power Dissipation	@ 25°c Ambient Any one Line	250	MW

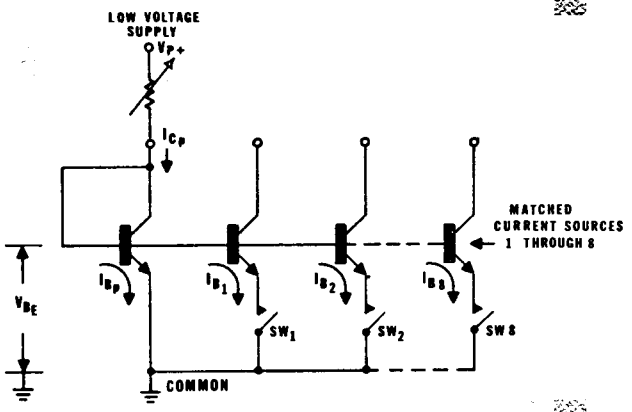


Figure 1

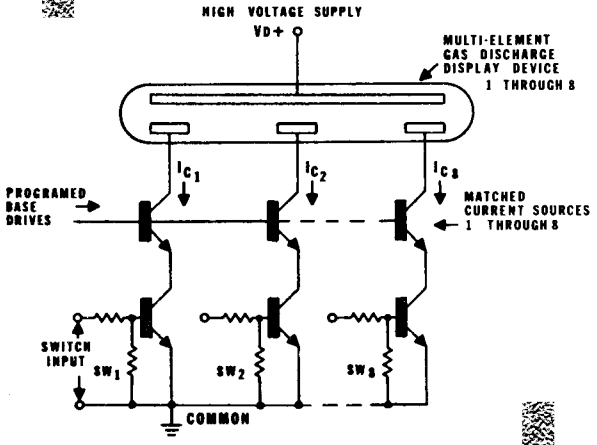


Figure 2

CIRCUIT OPERATION

The programmed constant current level of the circuit is established by the + VP supply through the series connected R1 and programming transistor, (See figure 1) Although the collector of this transistor is tied to its own base, it is still very much in its active region, with the current flow dividing between the collector and base paths, as determined by the H_{FE} characteristic of the device.

Eight additional high voltage transistors have their emitter-base junctions in parallel with the emitter-base of the programming transistor. Since all devices have matched emitter-base characteristics and are in parallel, sharing a common V_{BE}, base currents identical to that established in the programming transistor will flow through each of eight paralleled emitter-base junctions when they are switched on.

The eight switching transistors serve only to quench the base currents of the regulating transistors which in turn, hold off the full supply voltage. In the cathode driver, The collectors of the current source transistors are connected to the high voltage + VD supply through the cathodes of the gas discharge display device. (See figure 2)

In the level shifter, the return to the + VD supply is accomplished through the emitter-base junction of the anode switches.

The H_{FE} characteristic of all 8 regulating transistors are matched to each other and to the H_{FE} of the programming transistor. Because all devices are receiving identical base drives, they will have collector currents identical to the programmed current level established by R1. Because this program current is generated by a separate low voltage supply (VP+), it can be seen that the regulation of the constant current outputs are independent of variations in the high voltage supply.

SHORT CIRCUIT PROTECTION

A momentary short circuit within the gas discharge segment being driven will not result in any increased current flow through the circuit. The current to the display remains at the previously programmed level, with the full supply voltage being absorbed across the collector-emitter junction of the current regulating output transistor. Repeated momentary shorts at programmed current levels of up to 1.0 milliamp may be sustained without damage to the circuit.

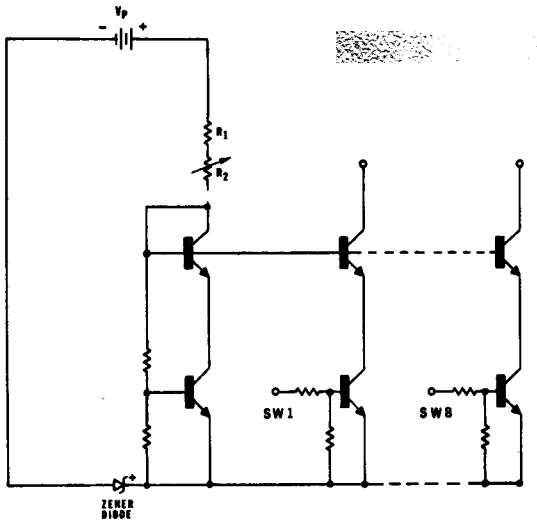


Figure 3

HIGH VOLTAGE INPUT DRIVE OPERATION

The base input resistors of switches SW-I through SW-8 are designed for operation from a nominal 5 volt ± 1 volt input voltage swing, with 6.0 volts being the absolute maximum rating.

When driving directly from M.O.S. circuitry where higher than 6 volt levels are involved, the addition of an external Zener diode (See Figure 3) will serve to clip the input voltages to the proper level. The Zener voltage should equal VP less 5 volts.

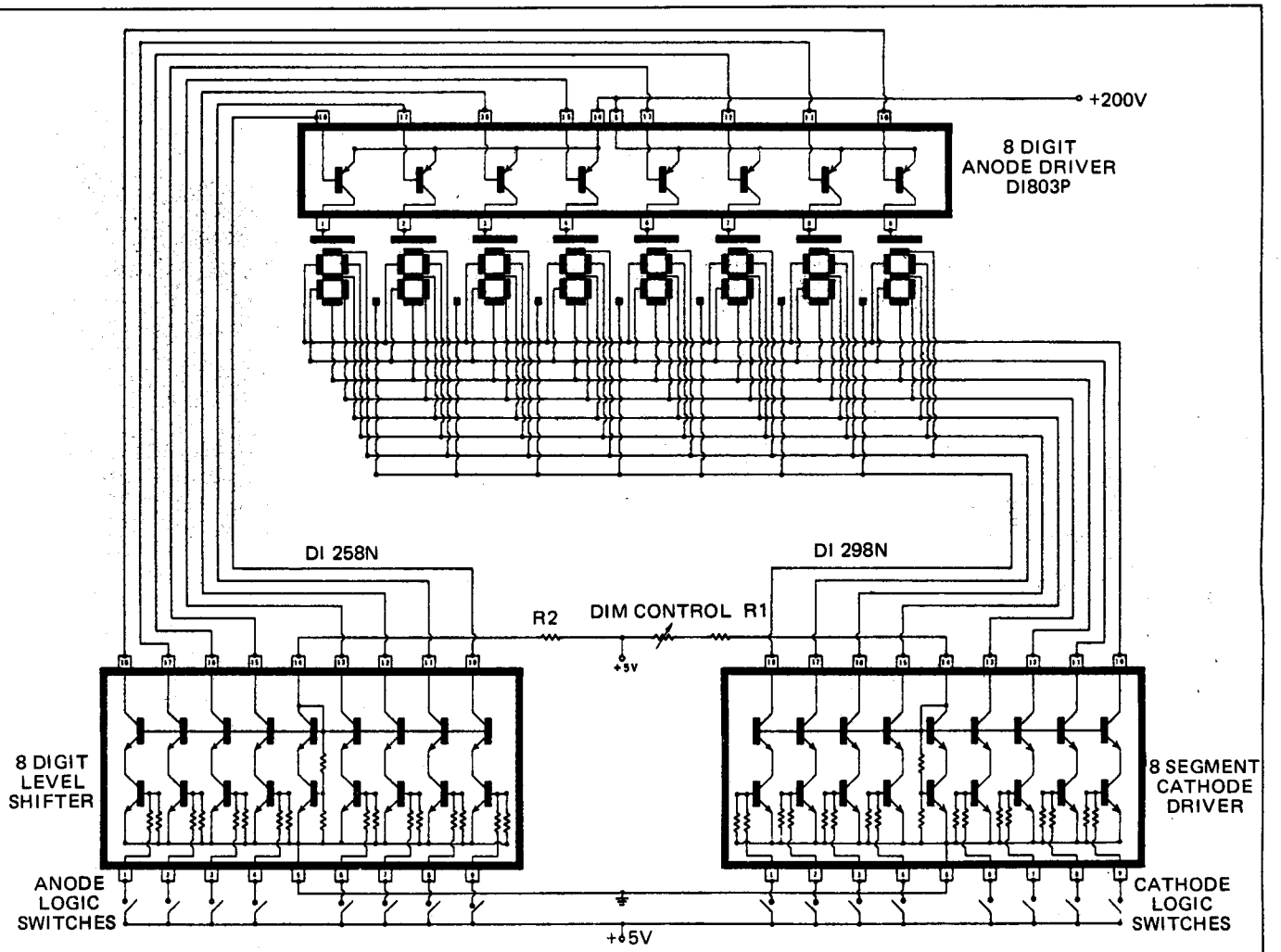


Figure 4

For operation in the multiplexed mode, master blanking of the driven display may be accomplished by inserting an external switching transistor in series with the current programming leg of the cathode driver, at the juncture of R1 and the programming power supply (+VP).

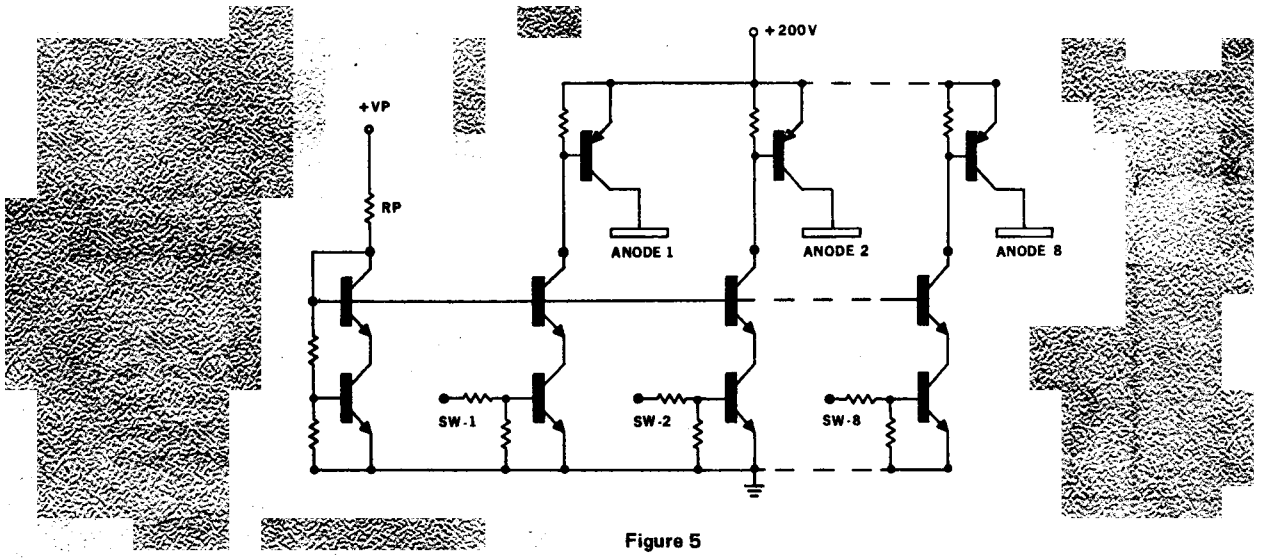


Figure 5

Due to the limited base drive available to each of the eight regulating transistors ($\frac{I_P}{H_{FE}}$), they are always operating in the active, unsaturated region and as such, are sustaining the full value of the high voltage supply.
Sufficient output current should be programmed to insure adequate saturation of the PNP anode switches at the anode current level being used. (see fig. 7)

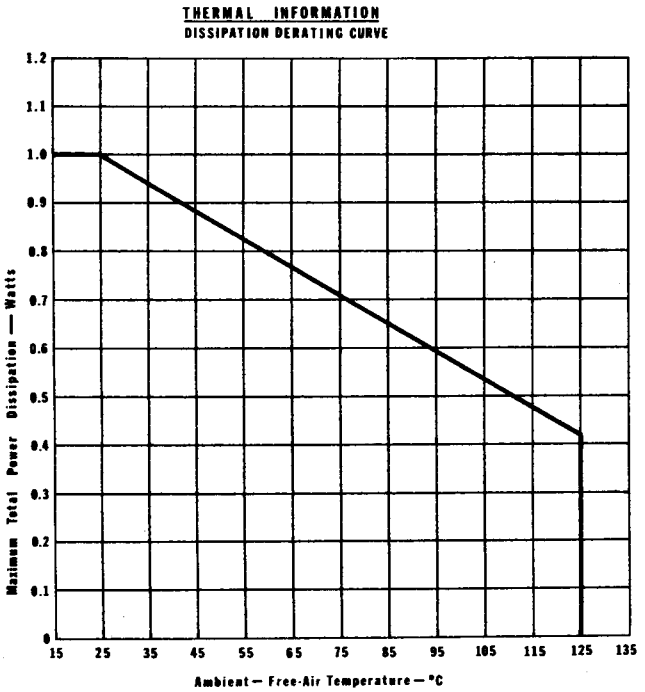


Figure 6

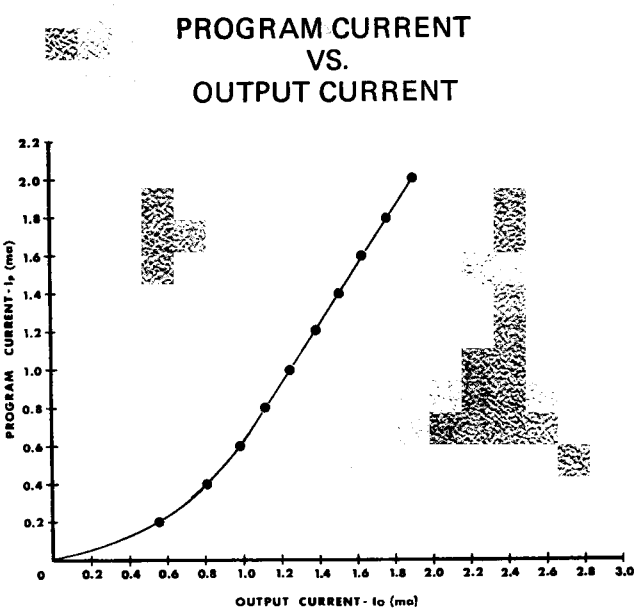


Figure 7

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