TDE1798
TDF1798

0.5 A INTELLIGENT POWER SWITCH

- HIGH OUTPUT CURRENT 500 mA
- SHORT-CIRCUIT PROTECTION UP TO V_{CC} = + 35 V
- INTERNAL THERMAL PROTECTION WITH EXTERNAL RESET AND SYNCHRONIZATION CAPABILITY
- OPEN GROUND PROTECTION
- OUTPUT VOLTAGE CAN BE LOWER THAN GROUND FOR FAST INDUCTIVE LOAD DE-MAGNETIZATION
- DIFFERENTIAL INPUTS FOR ANY LOGIC SYSTEM COMPATIBILITY
- INPUT VOLTAGE CAN BE HIGHER THAN V_{CC}
- LARGE SUPPLY VOLTAGE RANGE FROM 6 V TO 35 V
- SINK AND SOURCE ALARM OUTPUTS
- NO NEED EXTERNAL CLAMPING DIODE FOR DEMAGNETIZATION ENERGY UP TO 150 mJ
- SEVERAL DEVICES CAN BE CONNECTED IN PARALLEL

DESCRIPTION

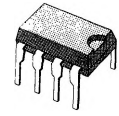
The TDE1798/TDF1798 is an interface circuit delivering high currents and capable of driving any type of loads.

This device is essentially blow out proof. The output is protected from short-circuits with the positive supply or ground. In addition thermal shut down is provided to keep the IC from overheating. If internal dissipation becomes too high, the driver will shut down to prevent excessive heating. The output stays null after the overload is off, if the reset input is low. If high the output will alternatively switch on and off until the overload is removed.

Higher current can be obtained by paralleling the outputs of several devices. In this case, the devices can be reactivated simultaneously after an overload if their reset input are connected in parallel.

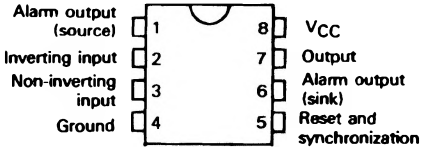
The device operates over a wide range of supply voltages from standard ± 15 V operational amplifier supplies to the single + 6 V or + 35 V used for industrial electronic systems. Input voltage can be higher than the V_{CC}. The output is low in open ground conditions.

MINIDIP/2

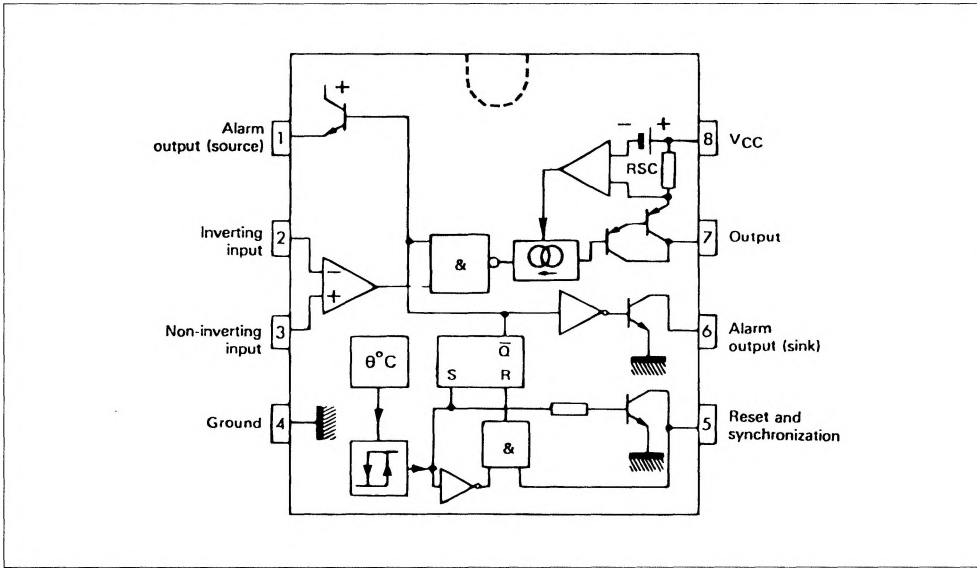


ORDER CODES : TDE1798DP

PIN CONNECTIONS (top view)



BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	50	V
V_{ID}	Input Differential Voltage	50	V
V_I	Input Voltage	– 30 to + 50	V
$V_{I(reset)}$	Reset Input Voltage	V_{CC} – 50 V to V_{CC}	V
I_O	Output Current	Internally Limited	A
P_{tot}	Power Dissipation	Internally Limited	mW
	Reset Input Sink Current (in thermal shut-down)	15	mA
W_D	Repetitive Maximum Demagnetization Energy 10^6 Operations	150	mJ
T_{oper}	Operating Ambient Temperature Range TDE1798DP TDF1798DP	– 25 to + 85 – 40 to + 85	°C
T_{stg}	Storage Temperature Range	– 65 to + 150	°C
$I_{A(sink)}$	Alarm Output Sink Current	25	mA
$I_{A(source)}$	Alarm Output Source Current	12	mA

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{th\ (j-c)}$	Maximum Junction-case Thermal Resistance (note 1)	30	°C/W
$R_{th\ (j-a)}$	Maximum Junction-ambient Thermal Resistance (note 1)	70	°C/W

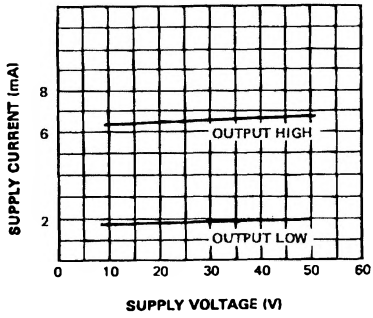
Note : 1. Devices bounded on 40 cm^2 glass-epoxy printed circuit 0.15 cm thick with 4 cm^2 of copper.

ELECTRICAL CHARACTERISTICS (note 2)
TDE – 25 °C ≤ T_j ≤ + 85 °C, 6 V ≤ V_{CC} ≤ + 35 V, I_O ≤ 500 mA, T_j ≤ + 150 °C (unless otherwise specified)
TDF – 40 °C ≤ T_j ≤ 85 °C, 6 V ≤ V_{CC} < 35 V, I_O ≤ 500 mA, T_j ≤ 150 °C

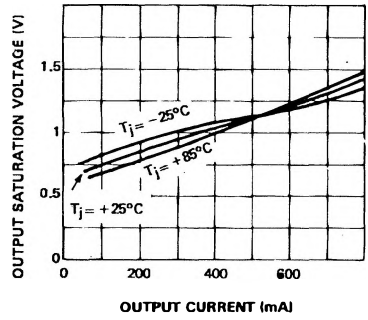
Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{IO}	Input Offset Voltage (note 3)	–	2	50	mV
I_{CC}	Power Supply Current Output High (T_{amb} = + 25 °C, I_O = 500 mA) Output Low	– –	6.5 2	8 4	mA
I_{IB}	Input Bias Current	–	15	40	µA
V_{ICR}	Common-mode Input Voltage Range (note 4)	1	–	45	V
V_I	Input Voltage Range (V_{ref} > + 1 V, note 4 and 5)	– 25	–	45	V
I_{SC}	Short-circuit Output Current (V_{CC} = 30 V, t = 10 ms)	0.7	0.9	1.3	A
$V_{CC} - V_O$	Output Saturation Voltage I_O = 500 mA ($\lvert V^+ - V^- \rvert$ > 50 mV)	–	1	1.25	V
I_{OL}	Output Low Leakage Current T_j = + 85 °C (V_{CC} = 30 V, V_O = 0 V)	–	10	100	µA
$I_{(pin\ 1)source}$ $I_{(pin\ 6)sink}$	Available Alarm Output Current Output Source Current (V (pin 1) = VCC – 2.5 V) Output Sink Current (in thermal shut-down), V (pin 6) = 2 V	 4 6	 8 15	 – –	mA
 I_{RH} I_{RL}	Reset Input Current	 – – 1	 15 0	 40 – 1	µA
$V_{th\ (reset)}$	Reset Threshold	0.8	1.4	2	V
I_{reset}	Reset Output Sink Current (in thermal shut-down) for V_{reset} ≤ + 0.8 V	2	–	–	mA
$I_{OL(open\ GND)}$	Output Leakage Current (open ground)	–	10	100	µA
V_{BRVEO}	Output Transistor Avalanche Voltage ($V_{CC} - V_O$)	65	–	110	V

Notes : 2. For operating at high temperature, the TDE1798 and TDF1798 must be derated based on a – 150 C maximum junction temperature and a junction-ambient thermal resistance of 70 °C/W.
3. The offset voltage given is the maximum value of input differential voltage required to drive the output voltage within 2 V of the ground or the supply voltage.
4. Input voltage range is independent of the supply voltage.
5. The reference input can be the inverting or the non-inverting one.

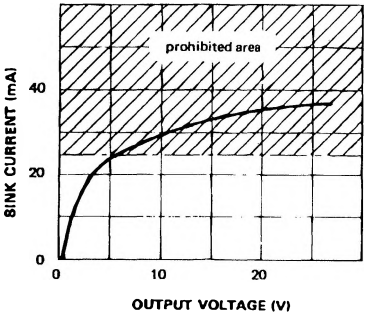
POWER SUPPLY CURRENT.



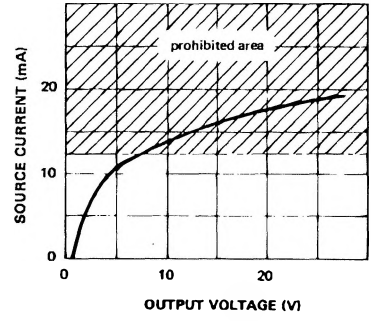
OUTPUT SATURATION VOLTAGE.



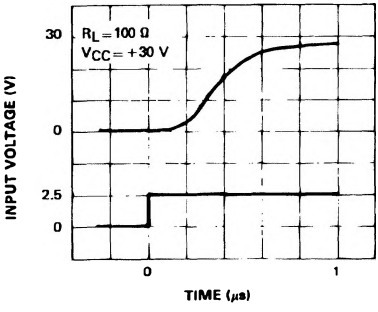
ALARM OUTPUT CURRENT SINK
(after thermal shut down).

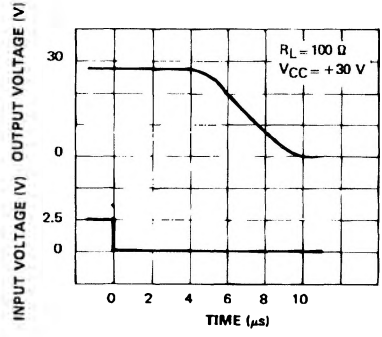


ALARM OUTPUT CURRENT SOURCE
(normal operation).



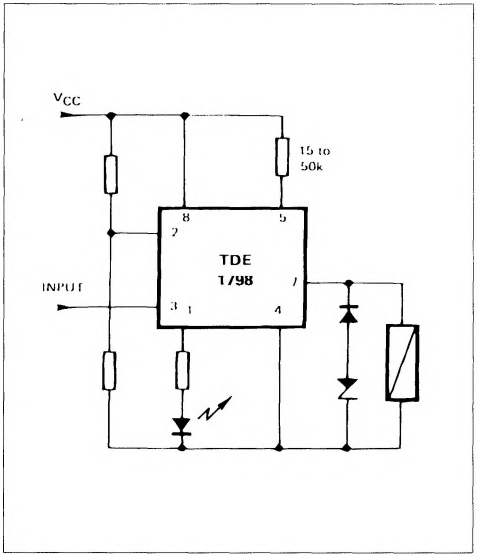
RESPONSE TIME.



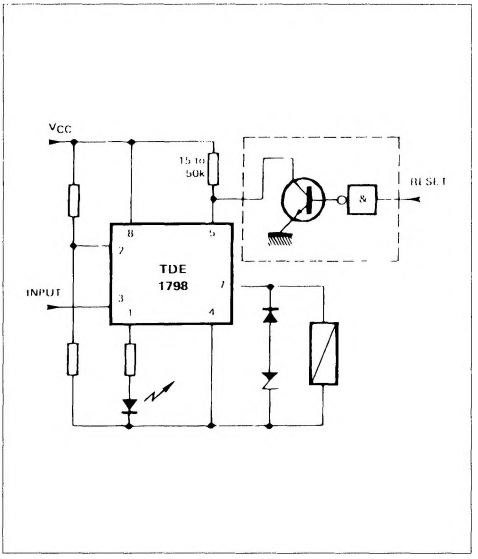


TYPICAL APPLICATIONS

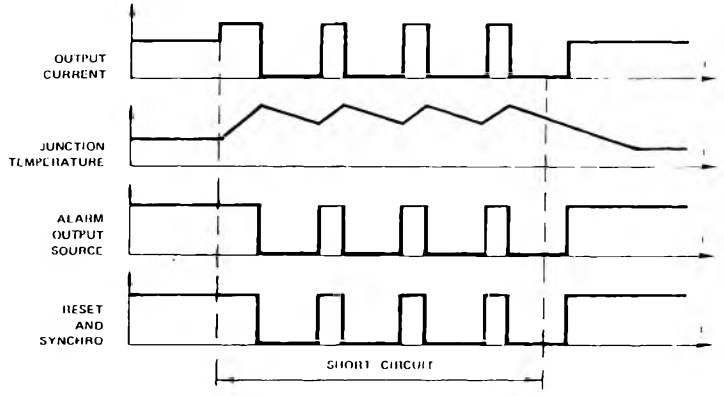
TYPICAL APPLICATION AUTOMATIC RESET



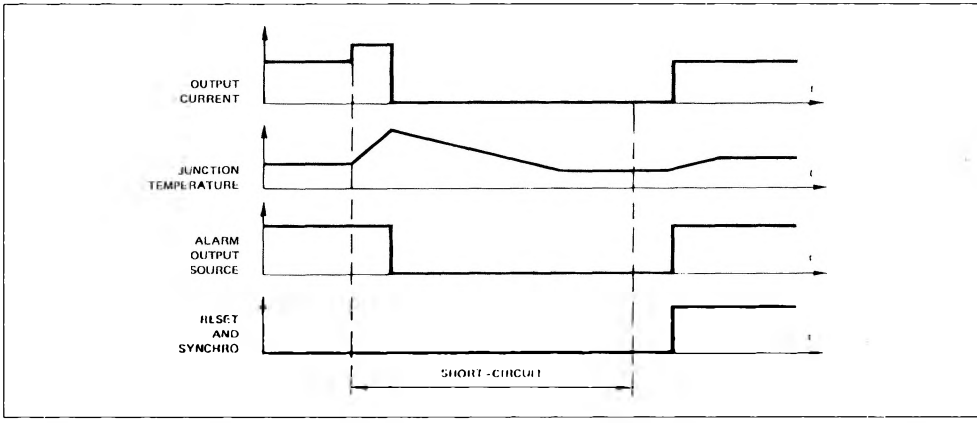
TYPICAL APPLICATION CONTROLLED RESET



SHORT CIRCUIT CONDITIONS WITH AUTOMATIC RESET



SHORT CIRCUIT CONDITIONS WITH CONTROLLED RESET



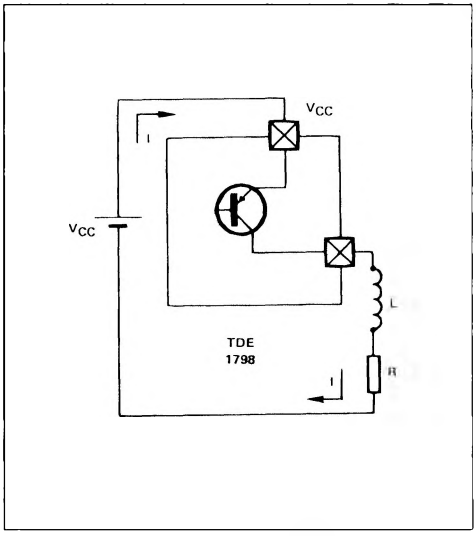
DEMAGNETIZATION OF INDUCTIVE LOADS WITHOUT EXTERNAL CLAMPING DEVICES.

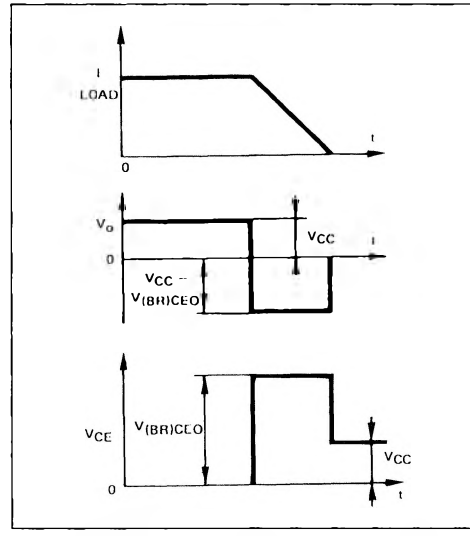
With no external clamping device, the energy of demagnetization is dissipated in the TDE1798 output stage, and the clamping voltage is the collector - emitter breakdown voltage $V_{(BR)\,CEO}$.

This method provides a very fast demagnetization of inductive loads and can be used up to 150 mJ.

The amount of energy W dissipated in the output stage during a demagnetization is :

$$W = V_{(BR)} \frac{L}{R} \left(I_o - \frac{V_{(BR)} - V_{CC}}{R} \text{Log} \left(1 + \frac{V_{CC}}{V_{(BR)} - V_{CC}} \right) \right)$$



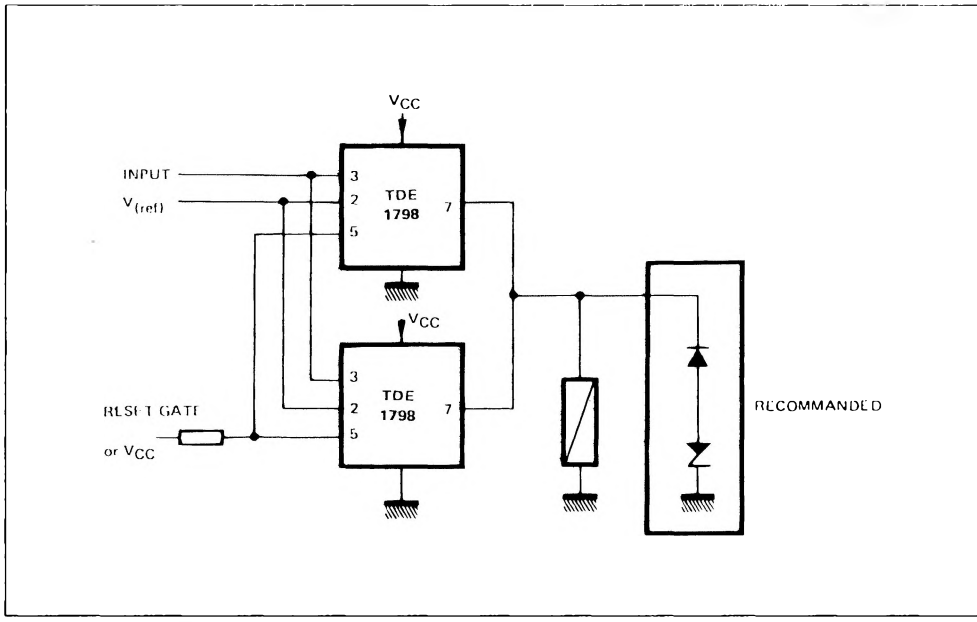


Remark 1 : This energy is dissipated inside the case, then must be included in the whole power dissipation.

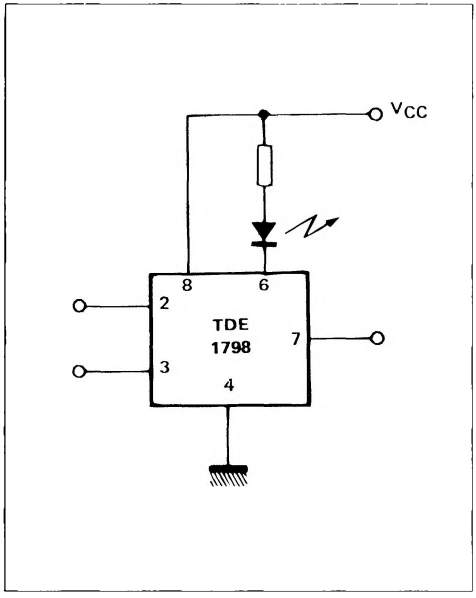
Remark 2 : The use of external clamping devices is recommended in case of parallel driving of loads.

The dispersion of the collector-emitter breakdown voltage V(BR) would induce the circuit with the lowest V(BR) to dissipate the whole demagnetization energy (which is roughly proportionnal to I_O^2).

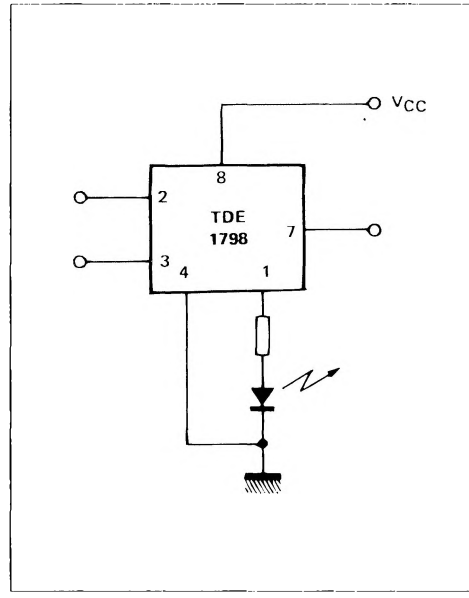
A 1 AMP. DRIVER (reset may be either automatic or controlled)



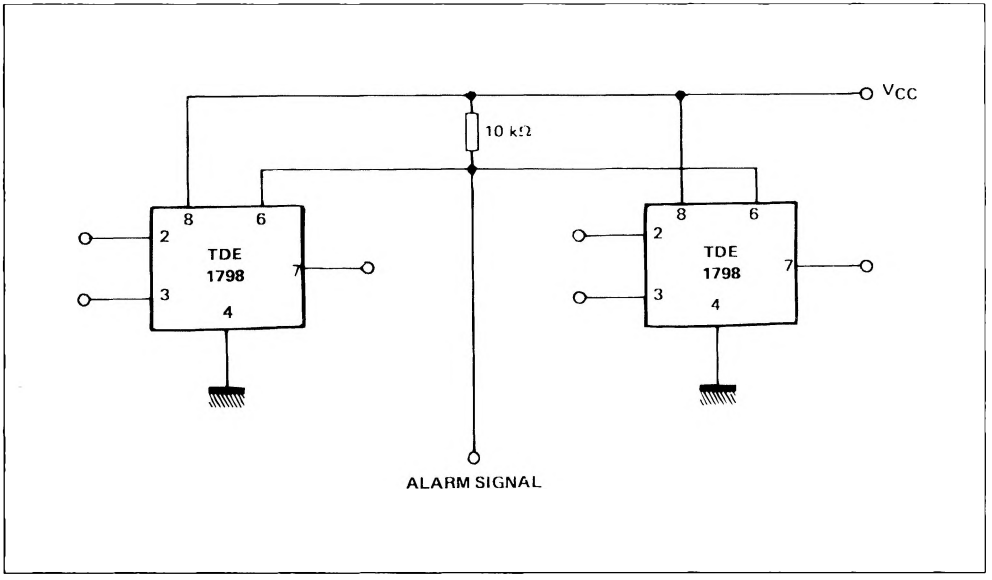
ALARM OUTPUT SINK



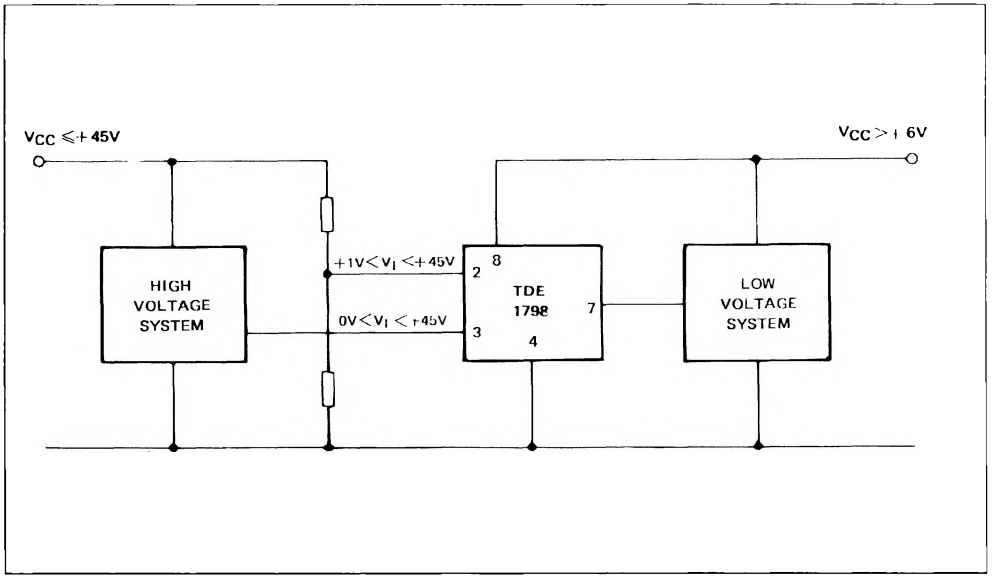
ALARM OUTPUT SOURCE



PARALLEL ALARM OUTPUTS



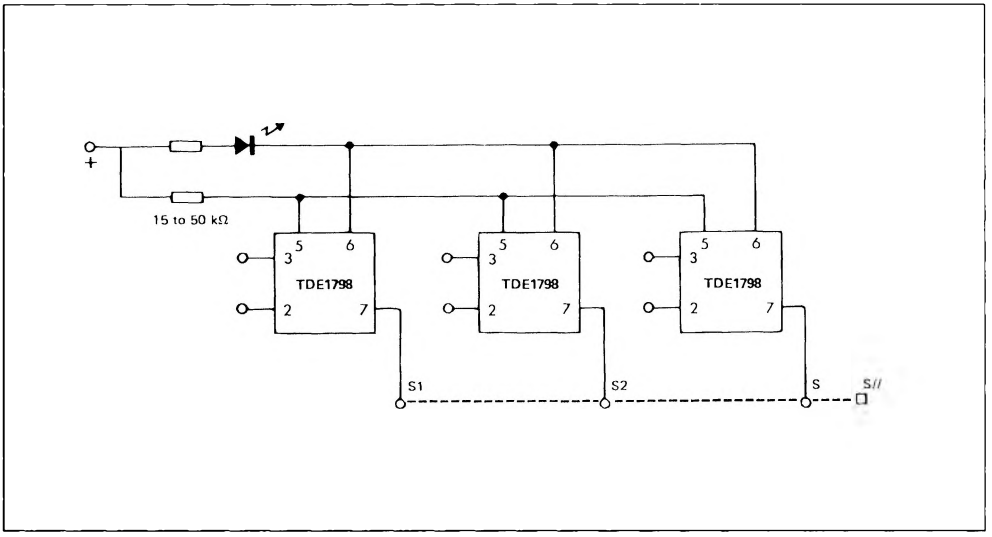
INTERFACE BETWEEN HIGH VOLTAGE AND LOW VOLTAGE SYSTEM



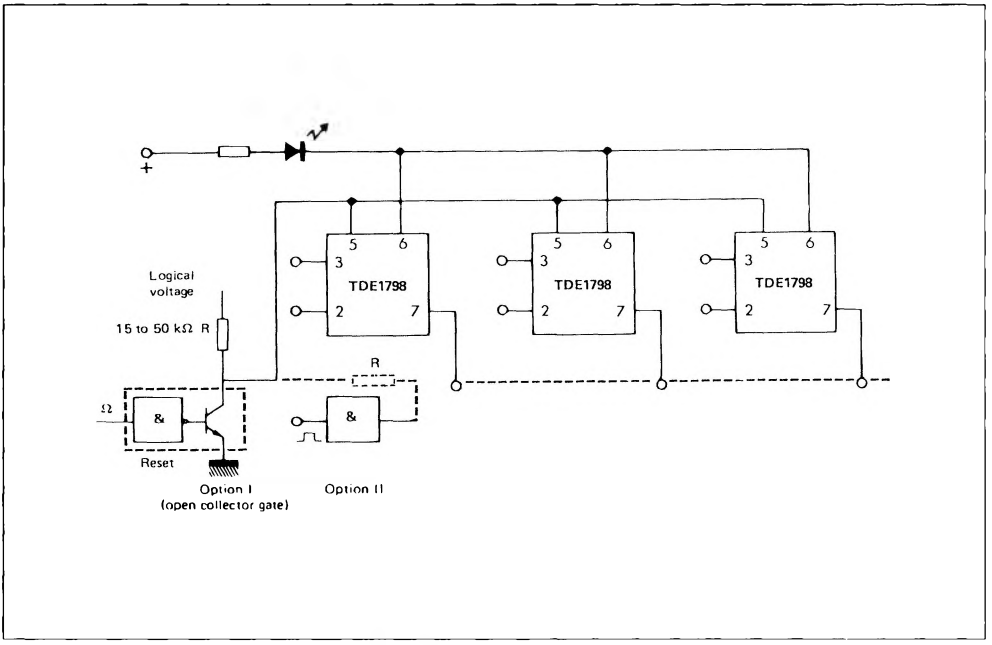
RESET AND SYNCHRONIZATION

Recommended diagram when the outputs are in parallel. After thermal disjunction a restart is possible when all the circuits are returned in operating conditions.

SYNCHRONOUS AUTOMATIC RESET (parallel or independent outputs)



SYNCHRONOUS CONTROLLED RESET (parallel or independent outputs)

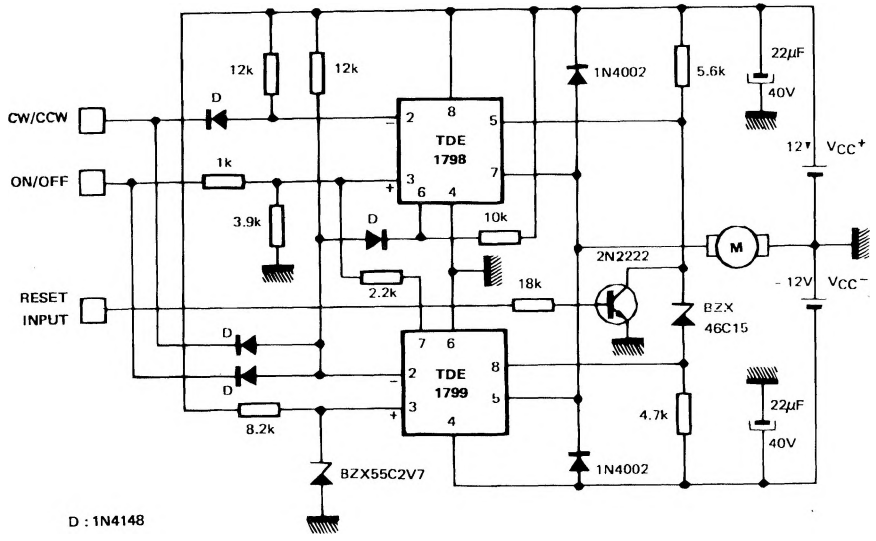


TWO QUADRANTS D.C. MOTOR DRIVE

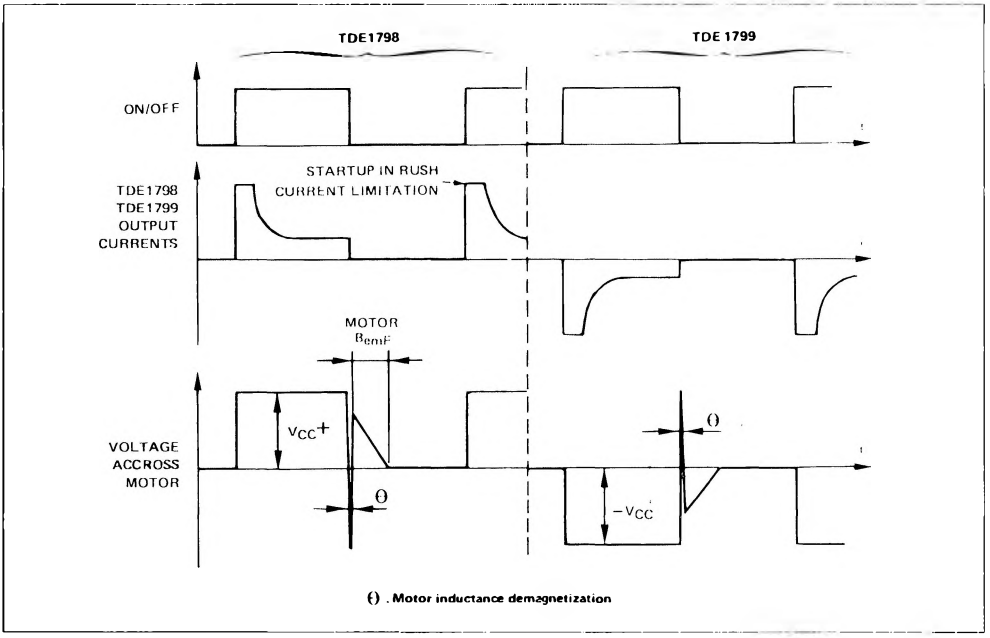
MAIN FEATURES

- $V_{CC} - V_{CC} \leq 50$ V
- Maximum output current 0.5 A
- Full protection against overloads and short-circuits
- No need of deadtime during rotation reversing
- TTL compatible inputs
- TDE1799 and TDE1798 input signals have the same reference
- No automatic restart after disjunction

CW/CCW	ON OFF	1798	1799
0	0	OFF	OFF
0	1	ON	OFF
1	1	OFF	ON
1	0	OFF	OFF

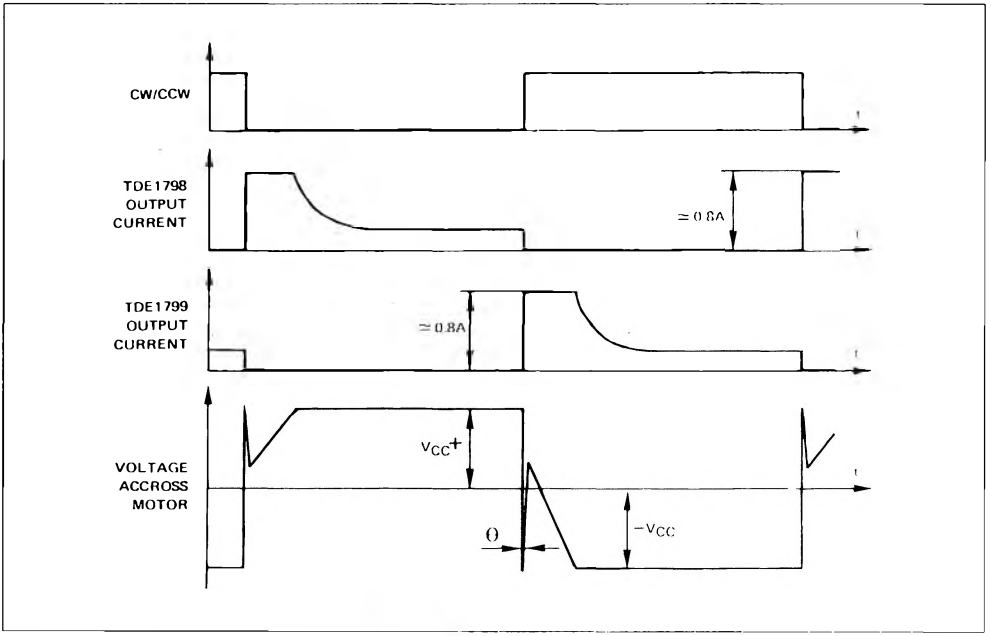


ON/OFF CYCLES

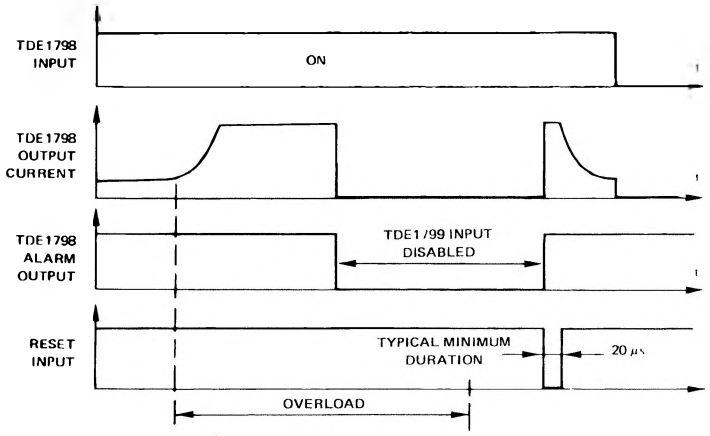


θ . Motor inductance demagnetization

ROTATION REVERSING



OVERLOAD CONDITIONS



* For instance overload during TDE1798 operation