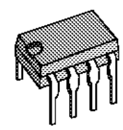
SGS-THOMSON
MICROELECTRONICS

TDE1798

0.5A INTELLIGENT POWER SWITCH

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



Minidip
ORDERING NUMBER: TDE1798DP

DESCRIPTION

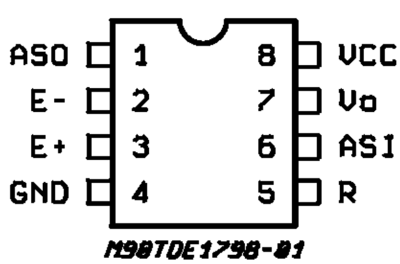
The TDE1798 is an interface circuit delivering high currents and capable of driving any type of loads.

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 operational amplifier supplies to the single ±6V or +35V used for industrial electronic systems. Input voltage can be higher than the V_{CC}. The output is low in open ground conditions.

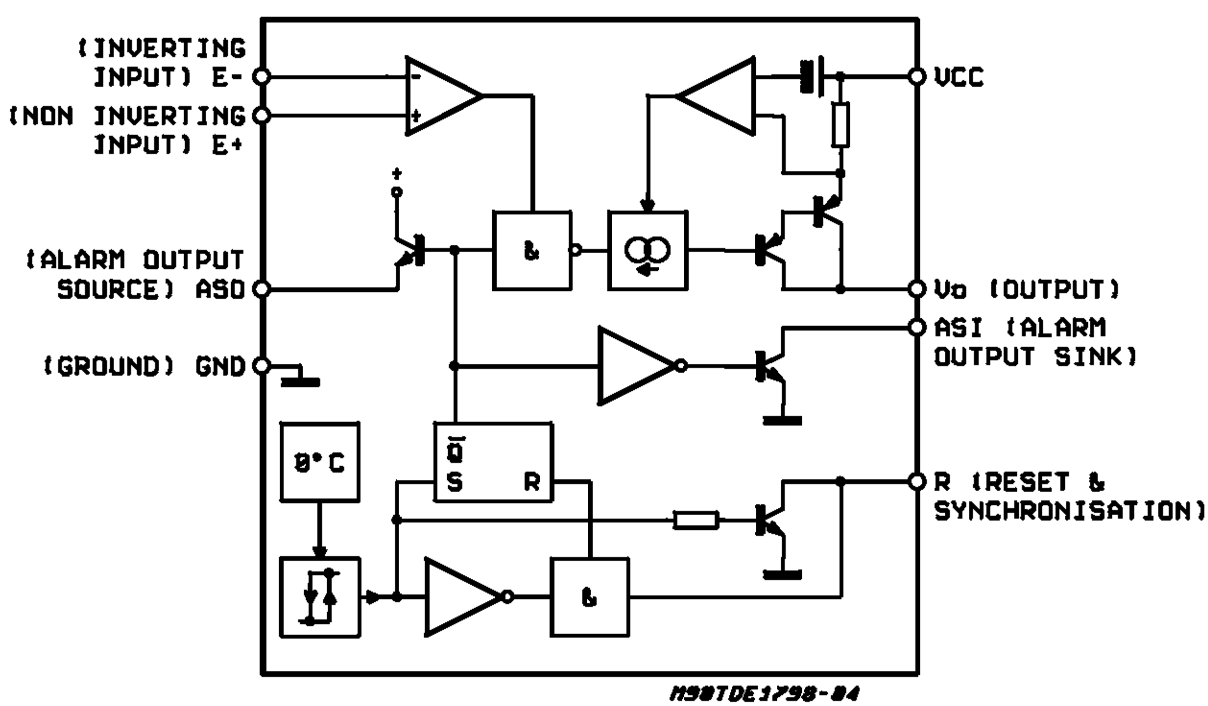
PIN CONNECTION (Top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Test Conditions	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	VCC -50 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_{op}	Operating Ambient Temperature Range	-25 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

BLOCK DIAGRAM



THERMAL DATA

Symbol	Description		Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case (1)	max.	30	°C/W
$R_{th\ j\text{-}ambient}$	Thermal Resistance Junction-ambient (1)	max.	90	°C/W

1) Devices bounded on a 40cm^2 glass-epoxy printed circuit 0.15cm thick with 4cm^2 of copper

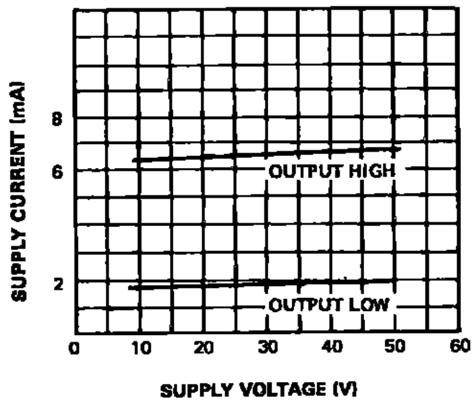
ELECTRICAL CHARACTERISTICS (note 2)

TDE -25°C ≤ T_j ≤ +85°C, 6V ≤ V_{CC} ≤ +35V, I_o ≤ 500mA (unless otherwise specified).

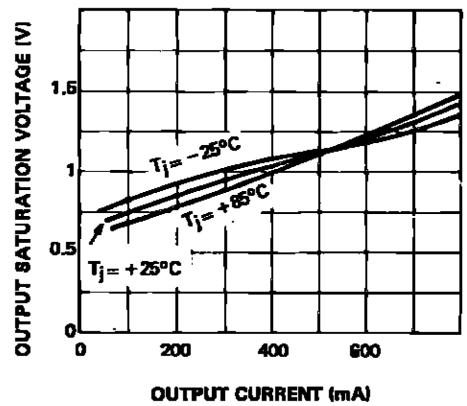
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IO}	Input Offset Voltage	(note 3)	–	2	50	mV
I_{CC}	Power Supply Current	Output High (Tamb = +25°C, I_o = 500mA) Output Low	– –	6.5 2	8 4	mA mA
I_{IB}	Input Bias Current		–	15	40	µA
V_{ICR}	Common-mode Input Voltage Range	(note 4)	1	–	45	V
V_I	Input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

Notes:
2) For operating at high temperature, the TDE1798 must be derated based on a 150°C maximum junction temperature and the junction-ambient thermal resistance.
3) The offset voltage given is the maximum value of input differential voltage required to drive the output voltage within 2V 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.

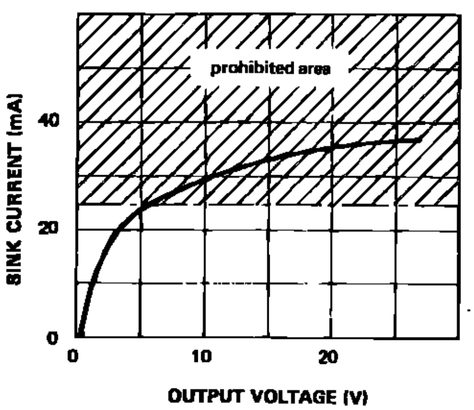
POWER SUPPLY CURRENT.



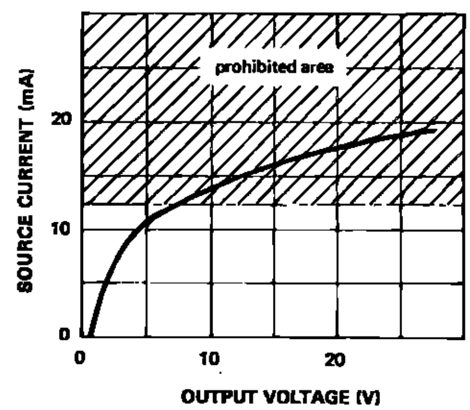
OUTPUT SATURATION VOLTAGE.



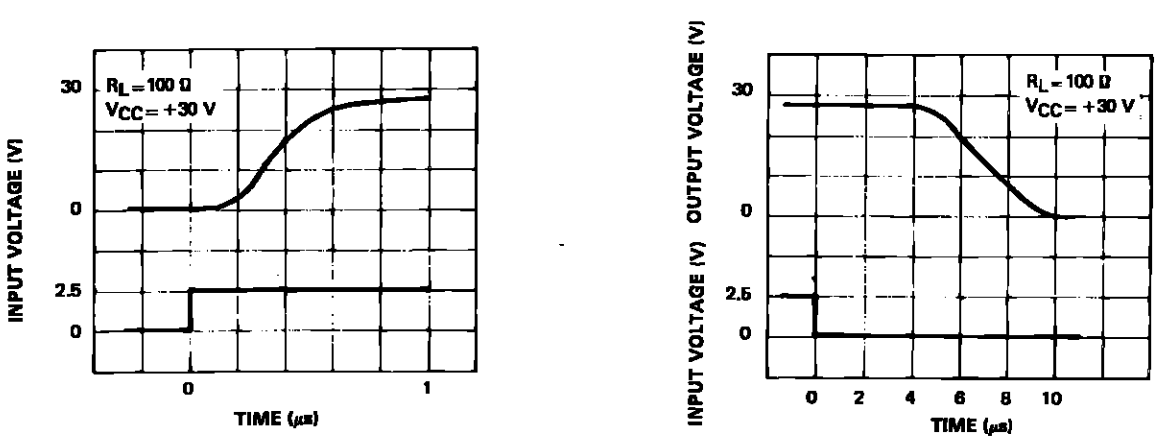
ALARM OUTPUT CURRENT SINK
(after thermal shut down).



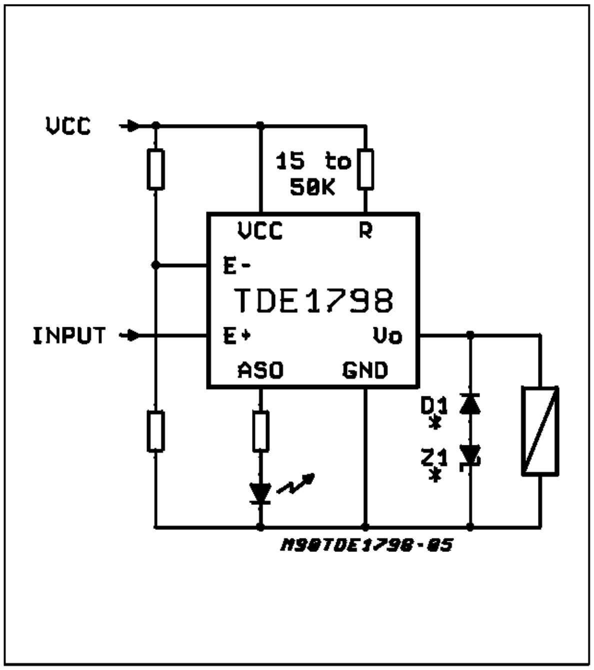
ALARM OUTPUT CURRENT SOURCE
(normal operation).



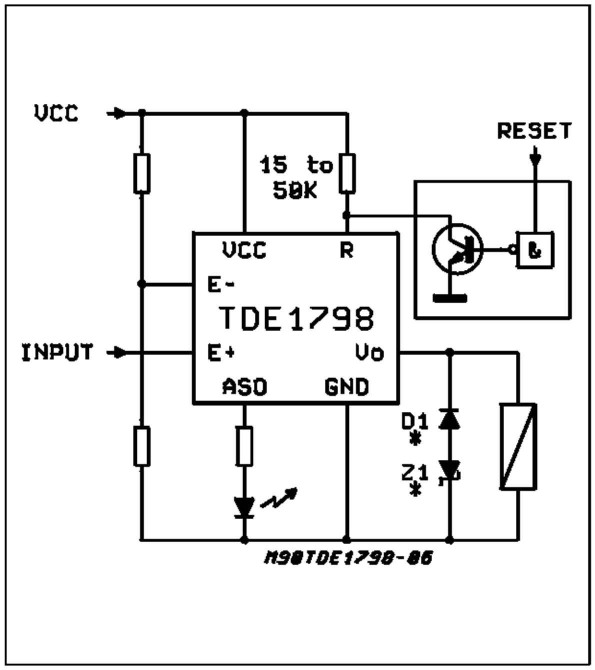
RESPONSE TIME.



TYPICAL APPLICATION AUTOMATIC RESET

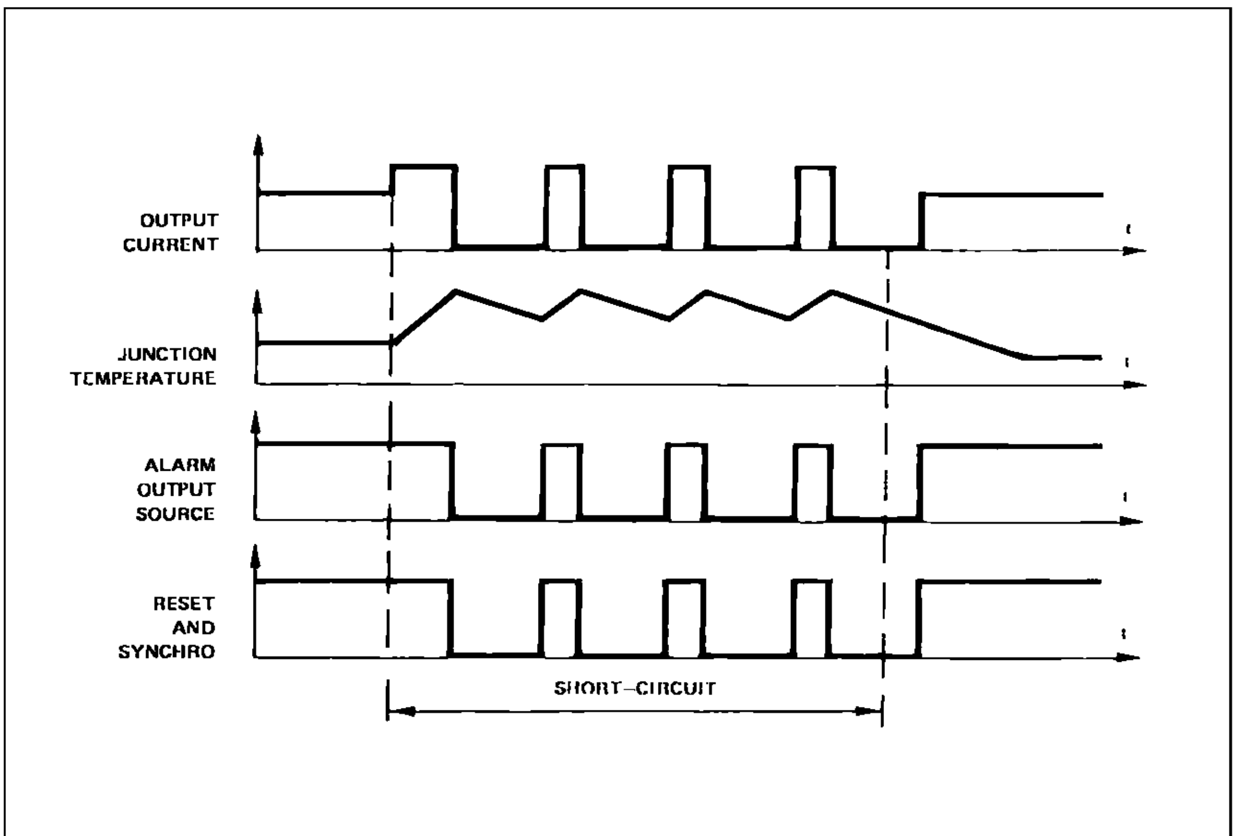


TYPICAL APPLICATION CONTROLLED RESET

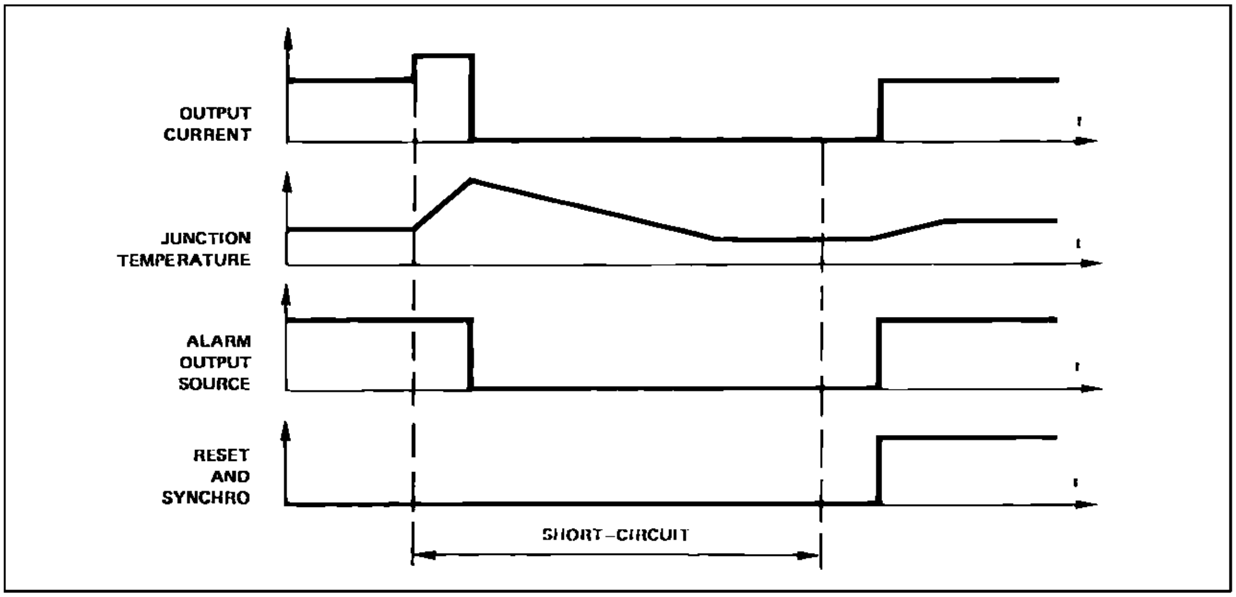


(*) D1 and Z1 needed if the demagnetization energy is higher than 150mJ

SHORT CIRCUIT CONDITIONS WITH AUTOMATIC RESET



SHORT CIRCUIT CONDITIONS WITH CONTROLLED RESET



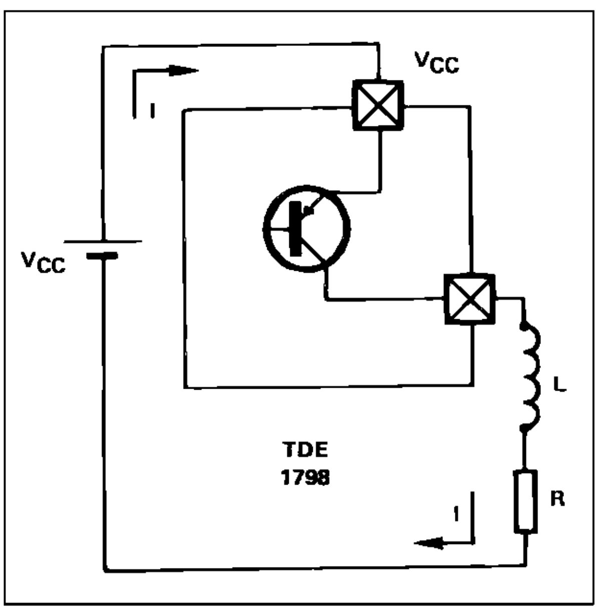
DEMAGNETIZATION OF INDUCTIVE LOADS WITHOUT EXTERNAL CLAMPING DEVICES.

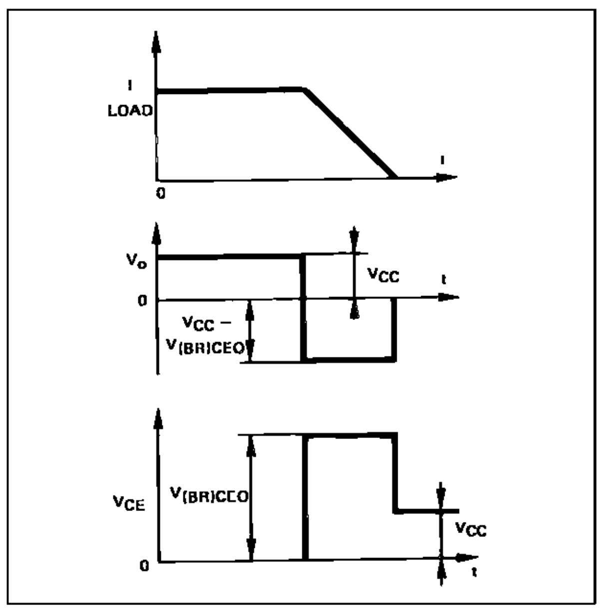
With no external clamping device, the energy of demagnetization is dissipated in the TDE1798 output stage, and the clamping voltage is the collector-emitter breakdown voltage $V_{(BR)CEO}$.

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 :

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

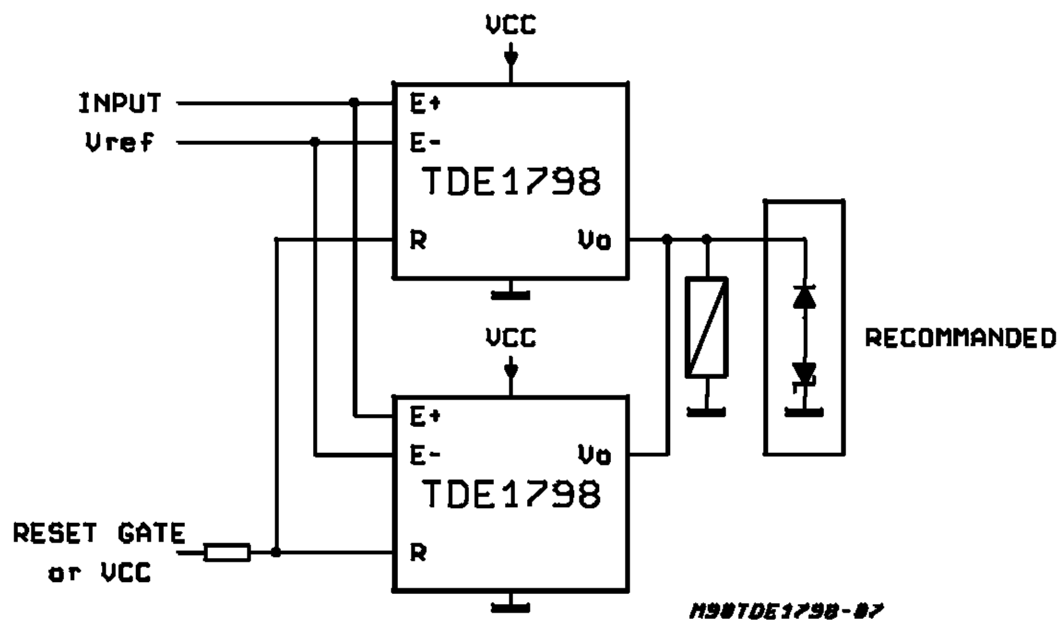




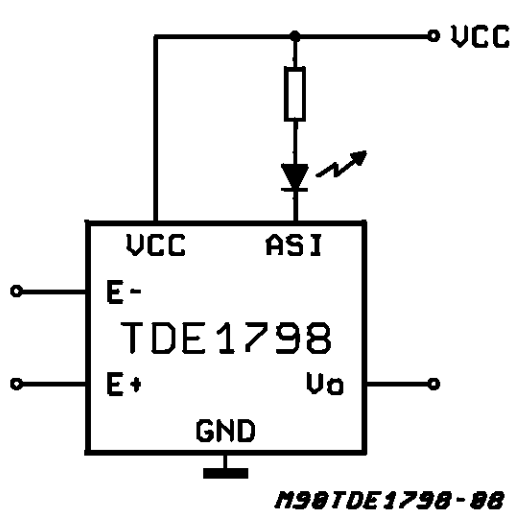
Remark 1 : This energy is dissipated inside the case, then must be included in the whole power dissipation.

Remark 2 : The use of external clamping device 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).

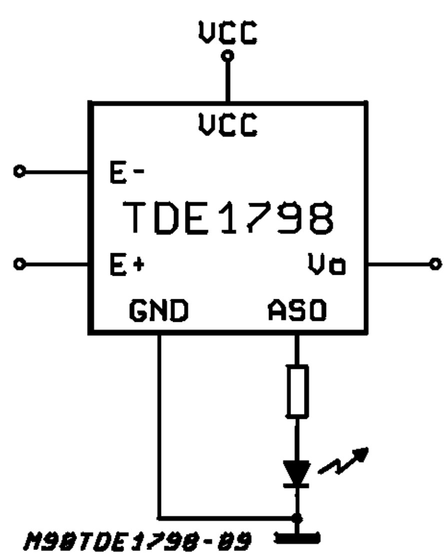
A 1 AMP. DRIVER (reset may be either automatic or controlled)



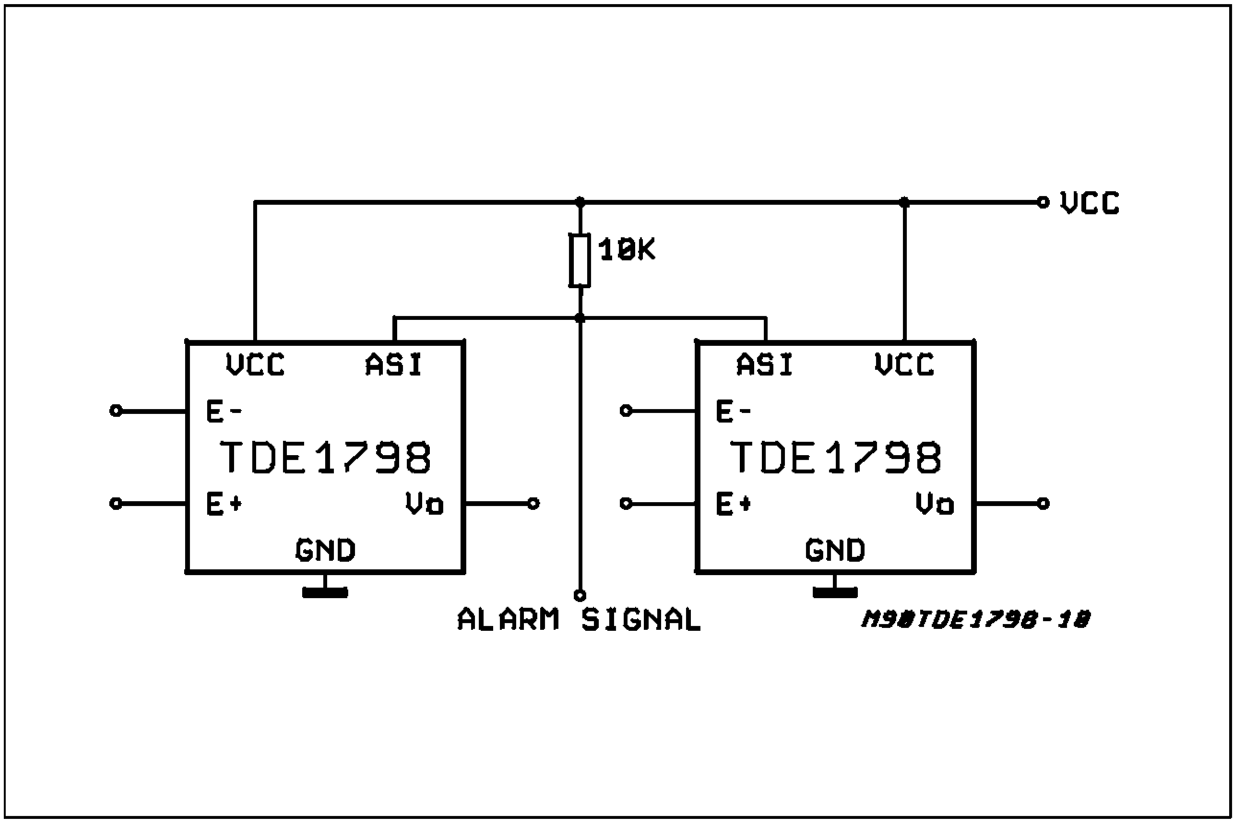
ALARM OUTPUT SINK



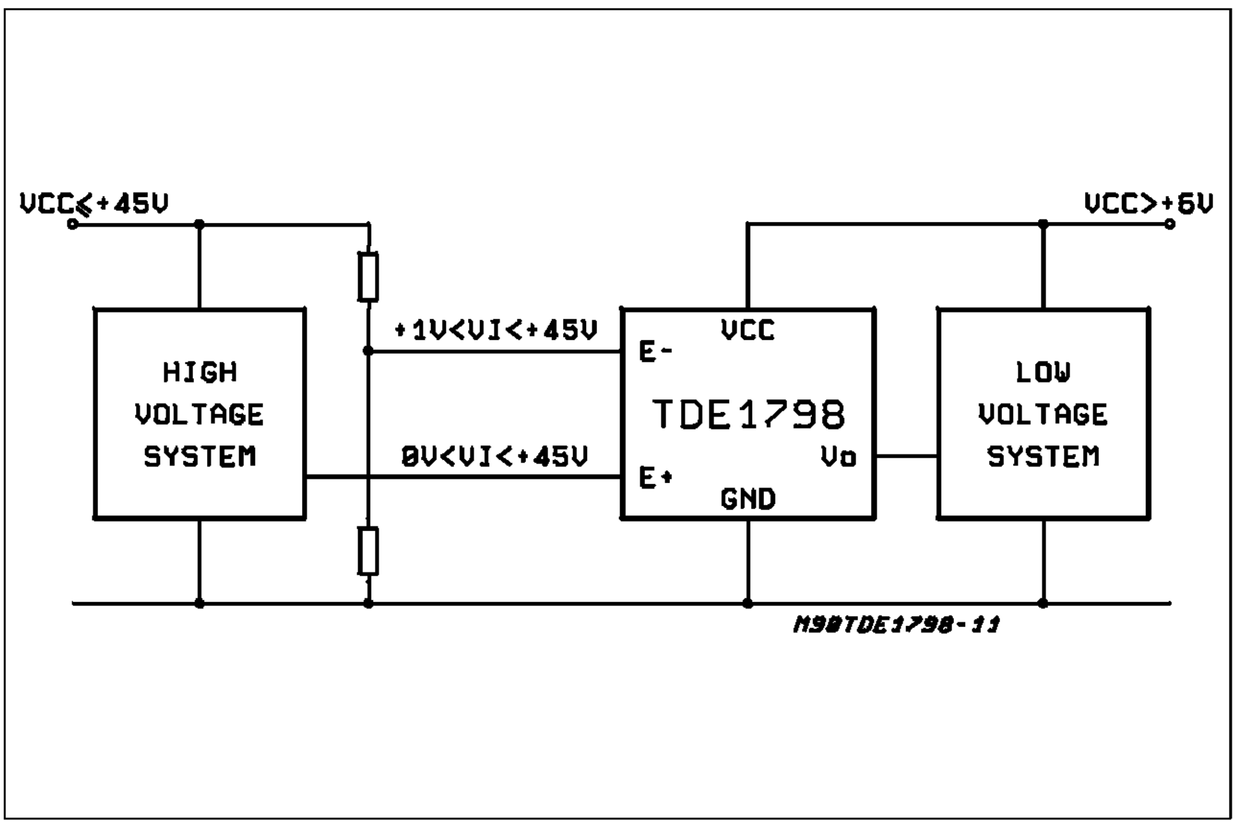
ALARM OUTPUT SOURCE



PARALLEL ALARM OUTPUTS



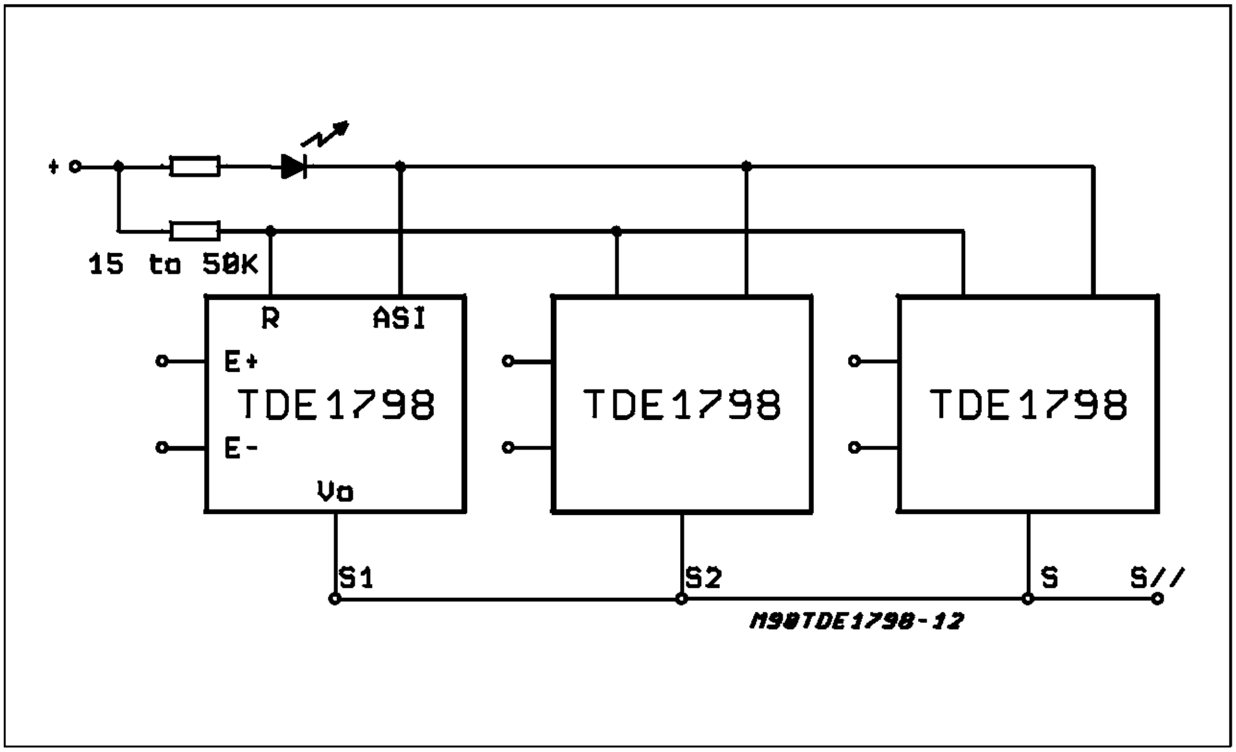
INTERFACE BETWEEN HIGH VOLTAGE AND LOW VOLTAGE SYSTEM



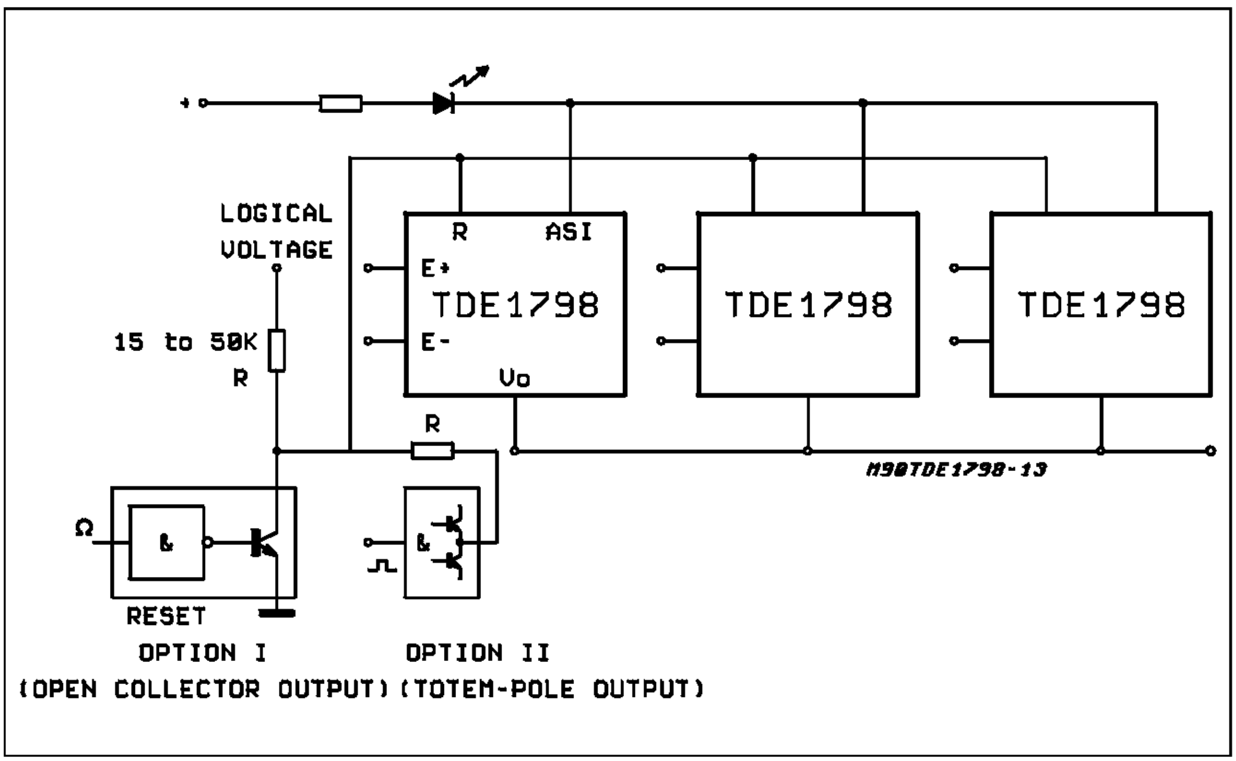
RESET AND SYNCHRONIZATION

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

SYNCRONOUS AUTOMATIC RESET (parallel or independentoutputs)



SYNCHRONOUS CONTROLLED RESET (parallel or idependentoutputs)

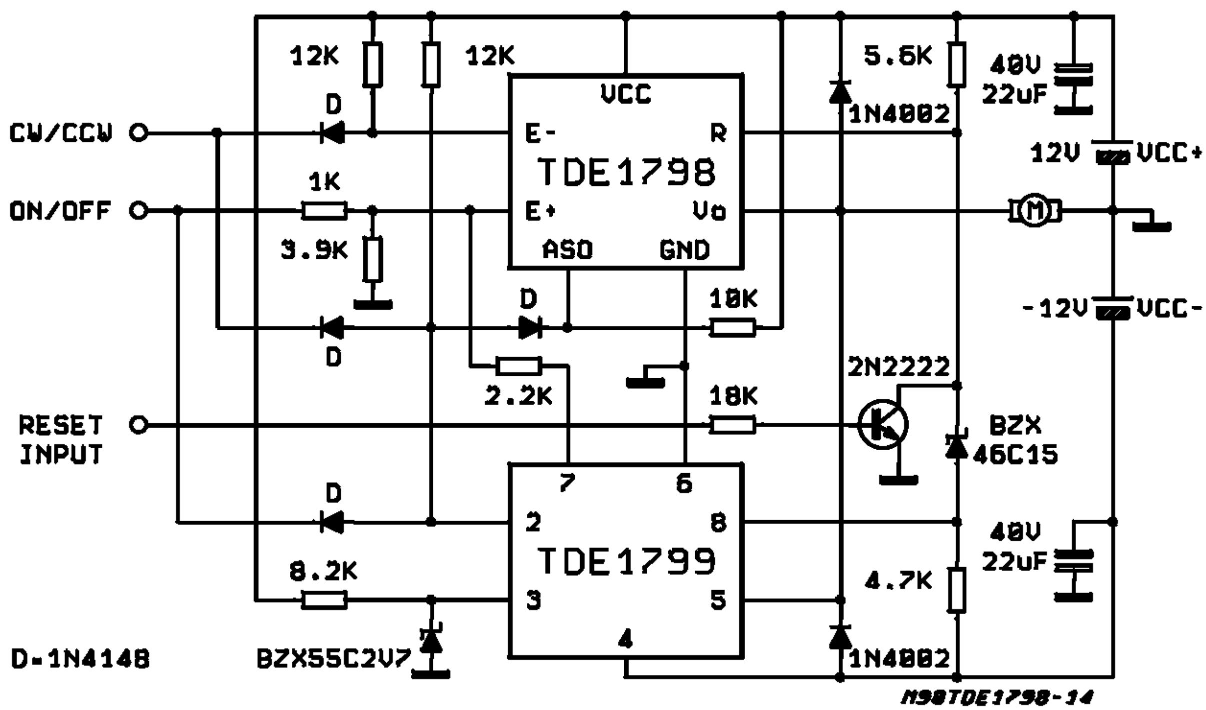


TWO QUADRANTS D.C. MOTOR DRIVE

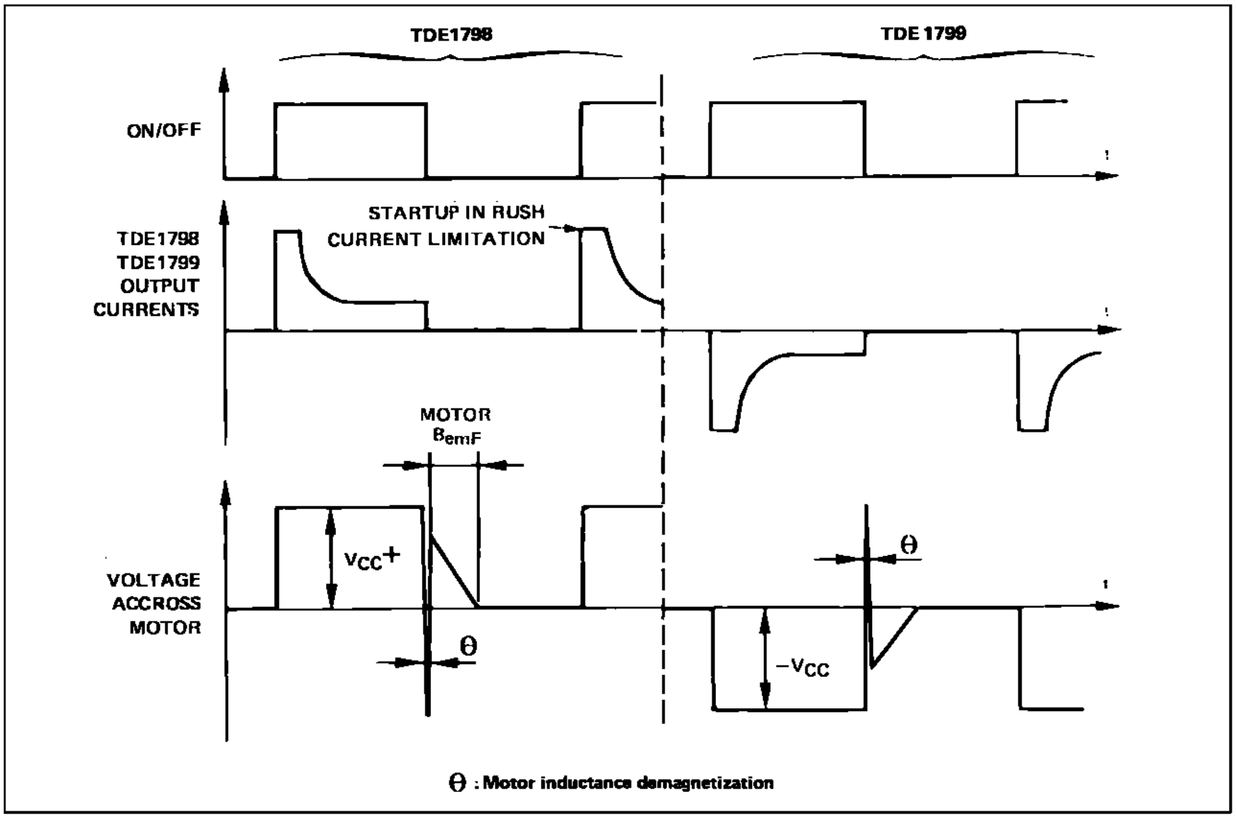
MAIN FEATURES

- $V_{CC} - V_{CC} \leq 50V$
- Maximum output current 0.5A
- 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

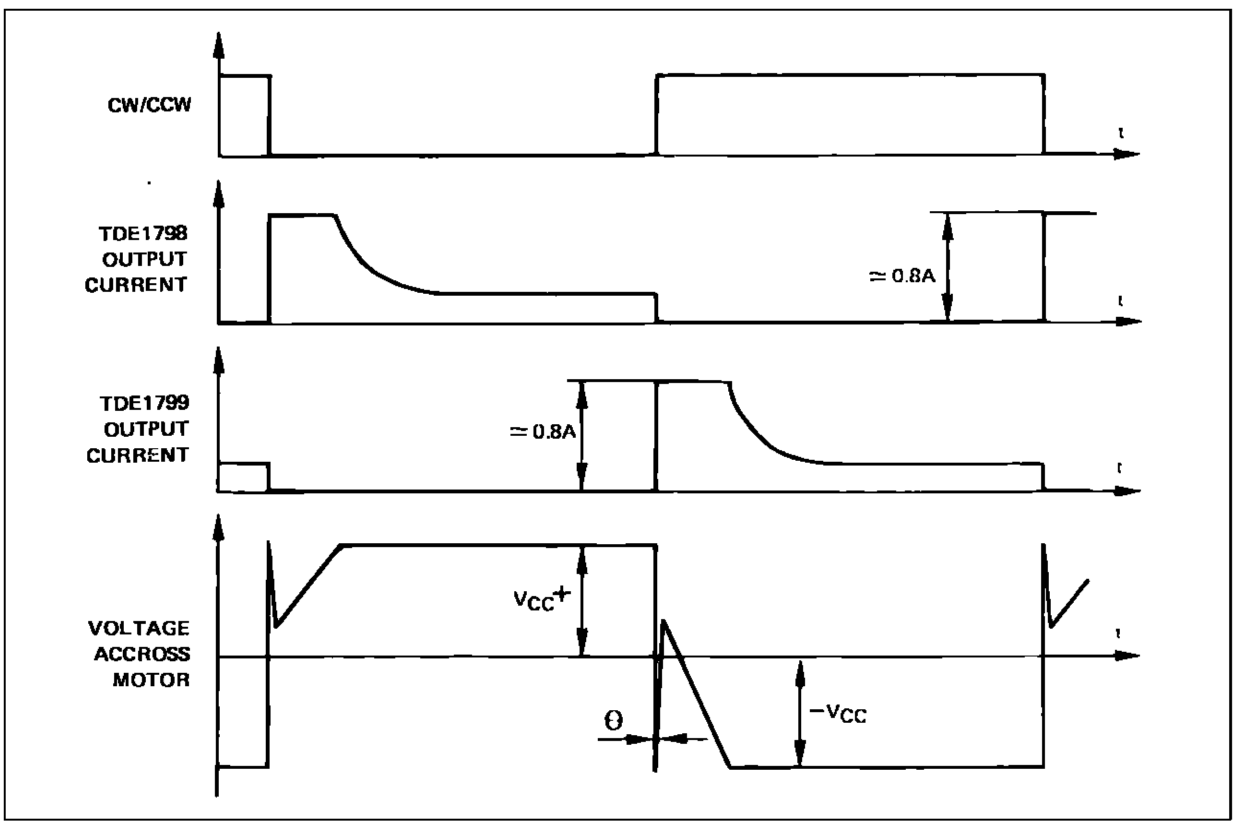
CW/CCW	ON PFF	1798	1799
0	0	OFF	OFF
0	1	ON	OFF
1	1	OFF	ON
1	0	OFF	OFF



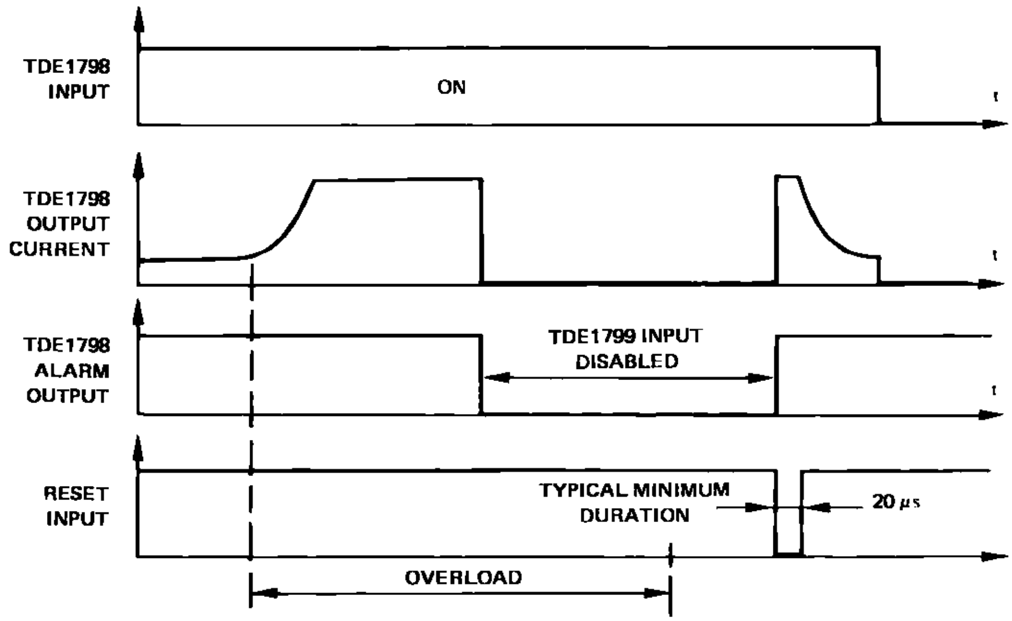
ON/OFF CYCLES



ROTATION REVERSING



OVERLOAD CONDITIONS



* For instance overload during TDE1798 operation

MINIDIP PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
I			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060