

The switching threshold at inputs DI and ENA can be adjusted between 1.5 V and 7 V via connection TS:

$$\begin{aligned}
 V_{TS} = 0 \text{ V}; & \quad \text{input threshold} = 1.5 \text{ V (for 5 V logic)} \\
 V_{TS} = 0 \text{ to } 5 \text{ V}; & \quad \text{input threshold} = V_{TS} + 1.5 \text{ V} \\
 V_{TS} = V_S: & \quad \text{input threshold} = 7 \text{ V (for 12/15 V and 24/28 V logic)}
 \end{aligned}$$

If the output is disabled due to the logic states of inputs DI or ENA this disable is effective over the total supply voltage range between  $V_S = 0 \text{ V}$  and  $V_S = 35 \text{ V}$ .

The inputs are protected with clamp diodes.

### Maximum Ratings

Description	Symbol	min	max	Unit	Notes
Supply voltage	$V_S$	-0.3	35	V	
Supply voltage	$V_S$	-0.3	45	V	100 ms duration, 1 s interval
Input voltage at DI and ENA	$V_{DI, ENA}$	-0.3	35	V	1)
Voltage at TS and SQ	$V_{TS, SQ}$	-0.3	45	V	
Output voltage $V_Q$ and voltage at C	$V_Q, V_C$	-0.3	$V_S$	V	
Voltage at W	$V_W$	$V_{CE}$	$V_S$	V	2)

**Characteristics**

Supply voltage  $4.5\text{ V} \leq V_S \leq 30\text{ V}$

FZL 4141 D  $0^\circ\text{C} \leq T_A \leq +70^\circ\text{C}$

FZL 4145 D  $-25^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$

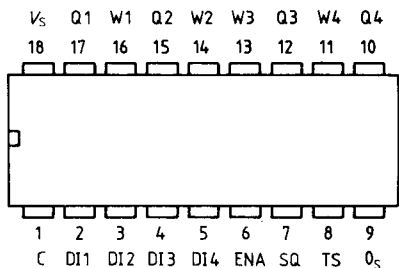
Description	Symbol	Test conditions	min	typ	max	Unit
Supply current	$I_S$	$V_{ENA} = 0\text{ V}, V_W = V_S$		6	8.5	mA
H input voltage at DI, ENA	$V_{IH}$	$V_{TS} = 0\text{ V}$	2			V
H input voltage at DI, ENA	$V_{IH}$	$V_{TS} = V_S$	8			V
L input voltage at DI, ENA	$V_{IL}$	$V_{TS} = 0\text{ V}$			0.7	V
L input voltage at DI, ENA	$V_{IL}$	$V_{TS} = V_S$			6	V
Input current at DI, ENA	$I_{DI, ENA}$	$0.5\text{ V} \leq V_{DI, ENA} \leq 30\text{ V}$	50		200	$\mu\text{A}$
L output voltage at SQ	$V_{SQ L}$	$I_{SQ} = 5\text{ mA}$			0.5	V
Output current available <sup>1)</sup>	$I_Q$ $I_Q$	$V_Q = V_S - 1.5\text{ V}$ $T_A = 0^\circ\text{C}$ , $V_Q = V_S - 1.5\text{ V}$	1.5 1.7	2.5		mA mA
Current from TS	$-I_{TS}$	$V_{TS} = 0\text{ V}$		2	10	$\mu\text{A}$
Switching threshold at W	$V_W$		$V_S - 0.6$	$V_S - 0.5$	$V_S - 0.4$	V
Current in W	$I_W$				100	$\mu\text{A}$
Current from C	$-I_C$	$T_A = 20^\circ\text{C}$	12	20	34	$\mu\text{A}$
Current in C	$I_C$	$T_A = 20^\circ\text{C}$	0.6	1	1.7	mA
Upper switching threshold at C	$V_{CU}$	$T_A = 20^\circ\text{C}$	1.6	2.1	1.7	V
Lower switching threshold at C	$V_{CL}$	$T_A = 20^\circ\text{C}$	0.6	0.9	1.2	V
Saturation voltage at T <sup>2)</sup>	$V_{QR}$	$V_W = V_S - 2\text{ V}, I_Q = 0$		$V_S - 0.3$		V
H output voltage	$V_{QH}$	$V_{ENA} = 0\text{ V}$	$V_S - 0.25$	$V_S - 0.02$		V

1) The actual output current is typically 0.5 mA higher, a value which is required as current for the short-circuit protection. However, only the value specified above is available to drive the external output transistors.

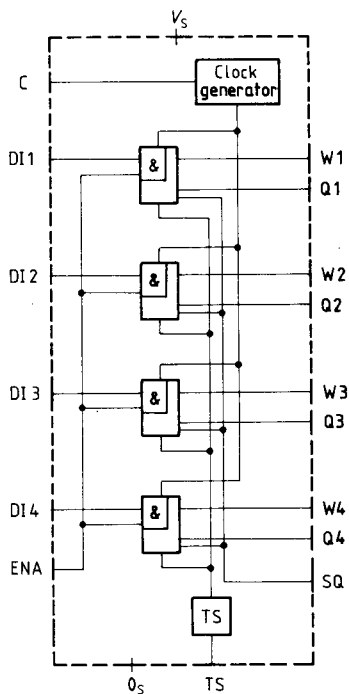
2) See block diagram

### Pin Configuration

top view

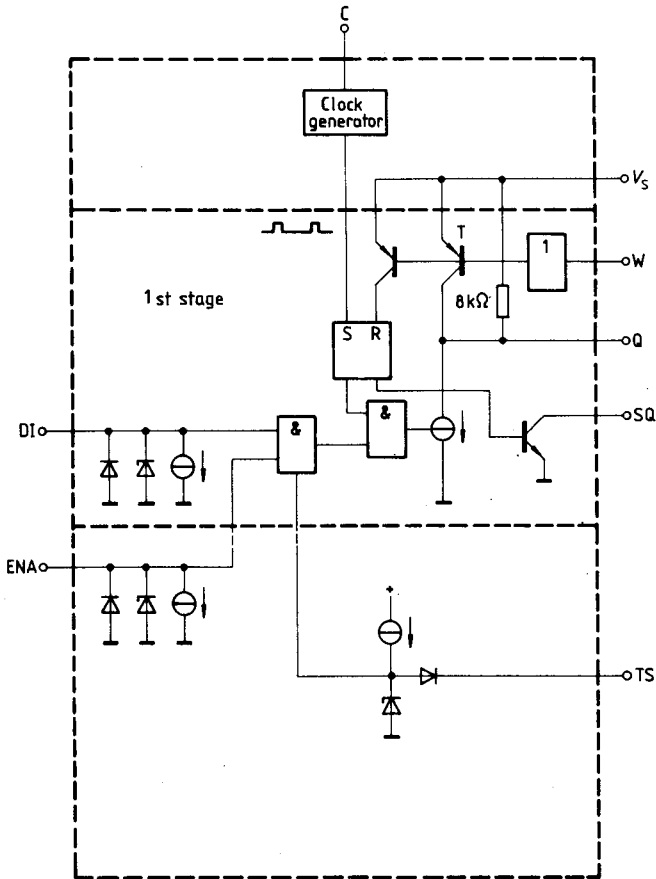


### Block Diagram



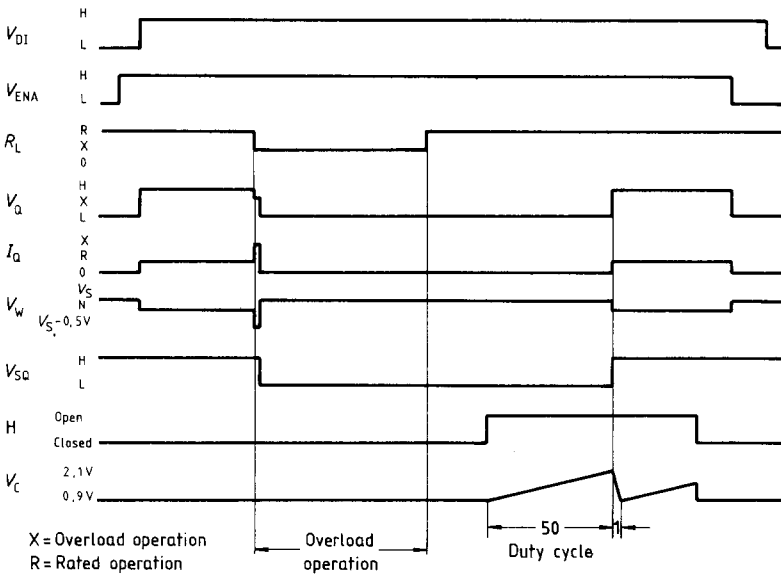
- DI Driver input
- ENA Enable input
- C Clock capacitor
- Q Output
- TS Input for threshold switching
- W Input for output current limiter
- SQ Signaling output

Schematic Circuit Diagram of One Stage

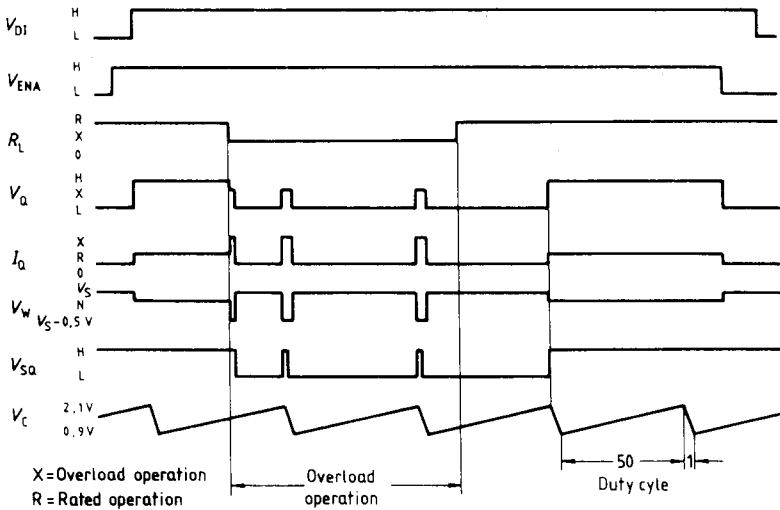


- DI Driver input
- ENA Enable input
- C Clock capacitor
- SQ Signaling output
- Q Output
- TS Input for threshold switching
- W Input for output current limiter

**Mode of Operation: Switching-On again after Overload with Key H**



**Mode of Operation: Automatic Switching-On again after Overload**



**Typical Application Circuits**

The load conditions at Q depend on the permissible power dissipation of the power transistors used. The pulsed power dissipation in case of a short circuit must be observed.

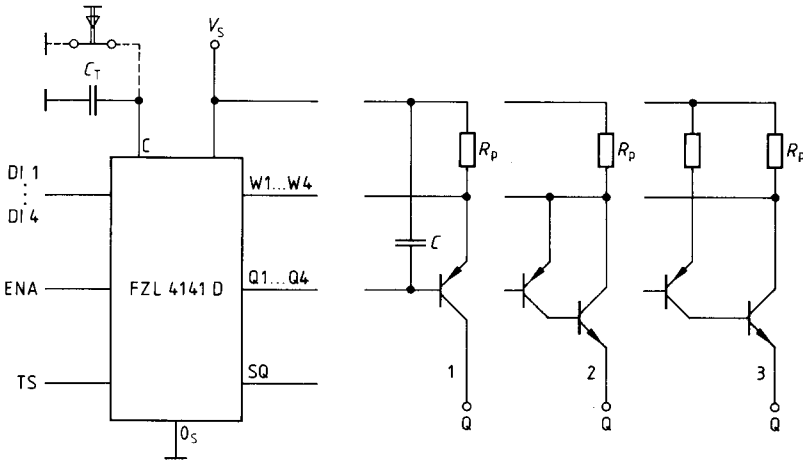
In order to suppress oscillations of the power stage in case of a short circuit, a capacitor C at Q1 to Q4 is necessary if e.g., fast switching transistors are used.

Typical value C approx. 20 nF.

The output circuit 1 is suited for currents up to approx.  $I_Q = 100$  mA.

The output circuits 2 and 3 are suited for currents up to approx.  $I_Q = 2$  A. A minimum power dissipation can be achieved with circuit 3.

A break key in parallel to  $C_T$  allows a manual switch-on in case of short circuit.



$R_p$  = Precision resistor (current measurement)

$C_T = 0.8 \times t_p$  ( nF,  $\mu$ s)

$t_p$  = Short-circuit current pulse length

**Note**

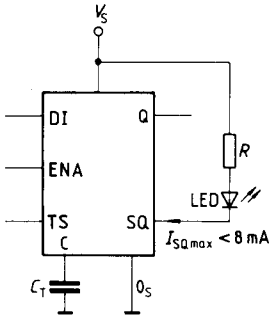
Circuit 1 does not permit a capacitor between Q1 and Q4 and the collector.

Circuit 2 does not permit a capacitor between Q1 and Q4 and base or emitter, respectively.

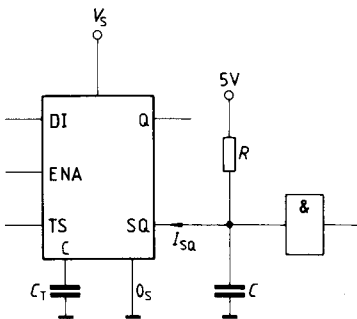
Otherwise too high current spikes would arise in case of a short circuit.

## Typical Application of Short-Circuit Signaling Output SQ

### 1. LED Display



### 2. TTL/CMOS/LSL Driving



If the pulses that appear at SQ during clocked operation disturb the remainder of the circuit, a lowpass filter will be necessary. For a load current of  $I_{SQ} = 1 \text{ mA}$  a capacitor C of approx. 10 nF is necessary to limit the output pulses of up to 10  $\mu\text{s}$  (depending on  $C_T$ ) to 1 V. Signaling occurs after approx. 50  $\mu\text{s}$ .

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