Programmable Diode Matrix

S 353
S 1353
S 2353

DIP 28
DIP 14
SO 14

This S 353 contains 160 diodes arranged in a 10 x 16 matrix. The S 1353 contains 32 diodes arranged in a 4x8 matrix, the S 2353 contains 42 diodes arranged in a 7x6 matrix.

For programming, an NiCr fuse is connected in series with the diode.

The matrix is primarily suitable:

1. to replace the extensive wiring in preselection switches. Instead of the multipole wired switch, a single-pole model can be used. Switch and matrix are connected in series.
2. to be used as encoder, decoder, and recorder. The matrix is connected before or behind the appropriate components, or connected between them. The electrical level is only changed by the value of one diode voltage. The electrical connection remains.
3. The component requires MOS handling to avoid undesired programming.
   One of the most important applications is e.g., to enable the programming of frequencies or line numbers, respectively, in conjunction with the PLL component S 187 and the video pulse generator S 178 A.

Maximum ratings of the individual diodes including fuse

		Lower limit B	Upper limit A	
Reverse voltage	V_R	20		V
Voltage between I and 0_S, Q and 0_S[1)]	V_{I0}, V_{Q0}	0	20	V
Forward current	I_F		2	mA
Programming current	I_{prog}		70	mA
Junction temperature	T_j		125	°C
Storage temperature	T_{stg}	−40	125	°C
Ambient temperature range	T_A	−25	70	°C

1) $V_0 \leq V_I$; V_Q; **example:** if V_I, V_Q are positive 0_S **must** be **grounded.**

Electrical characteristics of the individual diodes including fuse
$T_A = 25\,°C$, if not otherwise specified

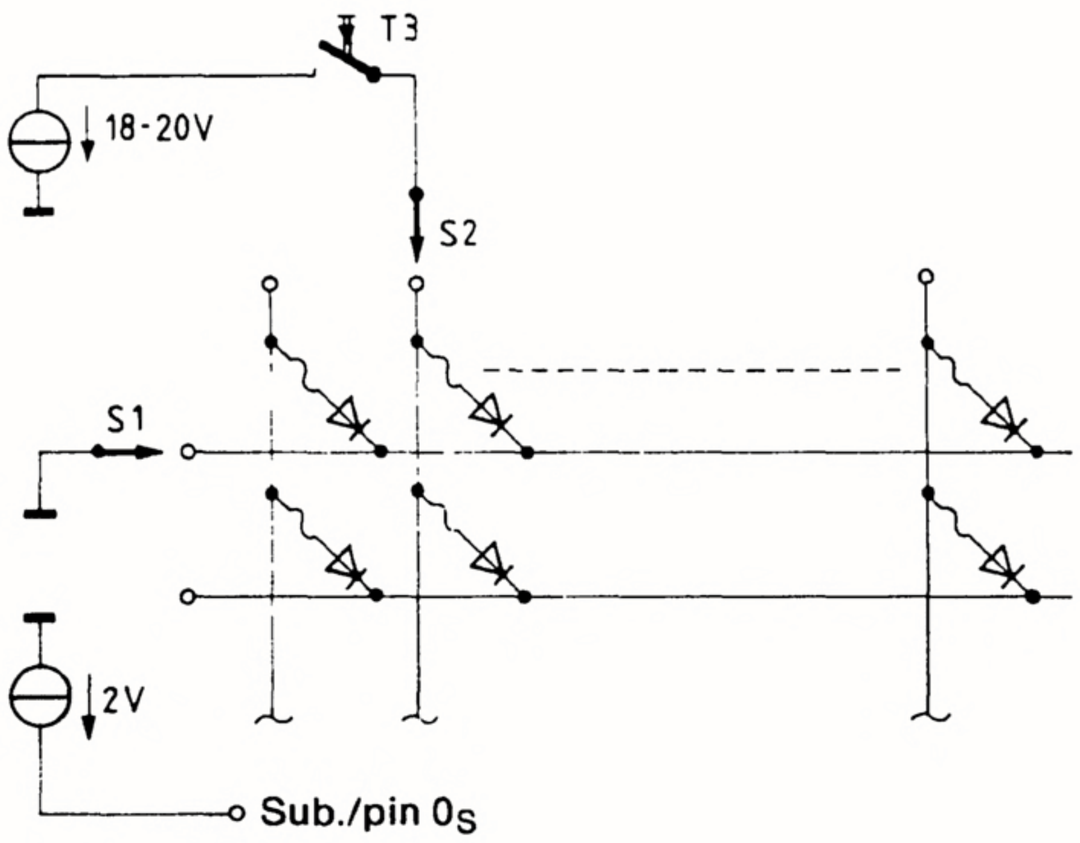
		Test conditions	Lower limit B	typ	Upper limit A	
Reverse voltage	V_R	$I_R = 100\ \mu A$	20			V
Forward voltage	V_F	$I_F = 1\ mA$		1	1.5	V
		$I_F = 50\ \mu A$			1.0	V
		$T_A = -25\,°C$				
		$I_F = 15\ \mu A$		0.8	0.85	V
		$T_A = -10\,°C$				
Reverse current I–Q	I_R	$V_R = 10\ V$		10	100	nA
Reverse current I–0_S[1)]	I_{R0}	$V_I = 10\ V$			500	nA
Programming current	I_{prog}	$V_Q = 20\ V$		50	70	mA
		$V_I = 0\ V$				
		$V_0 = -2\ V$				
Resistance of the suitably programmed fuse	R	$\lvert V_Q - V_I \rvert \leq 5\ V$	20			MΩ
Capacitance I–Q	C	$V_R = 2\ V$		6	9	pF
Recovery time	t_{rr}	$I_F = 200\ \mu A$		13	25	ns
		$V_{Rmax} = 2\ V$				
		$R_L = 1\ k\Omega$				
		Test at				
		$V_R = 0\ V$				

1) Reverse current of a single substrate diode

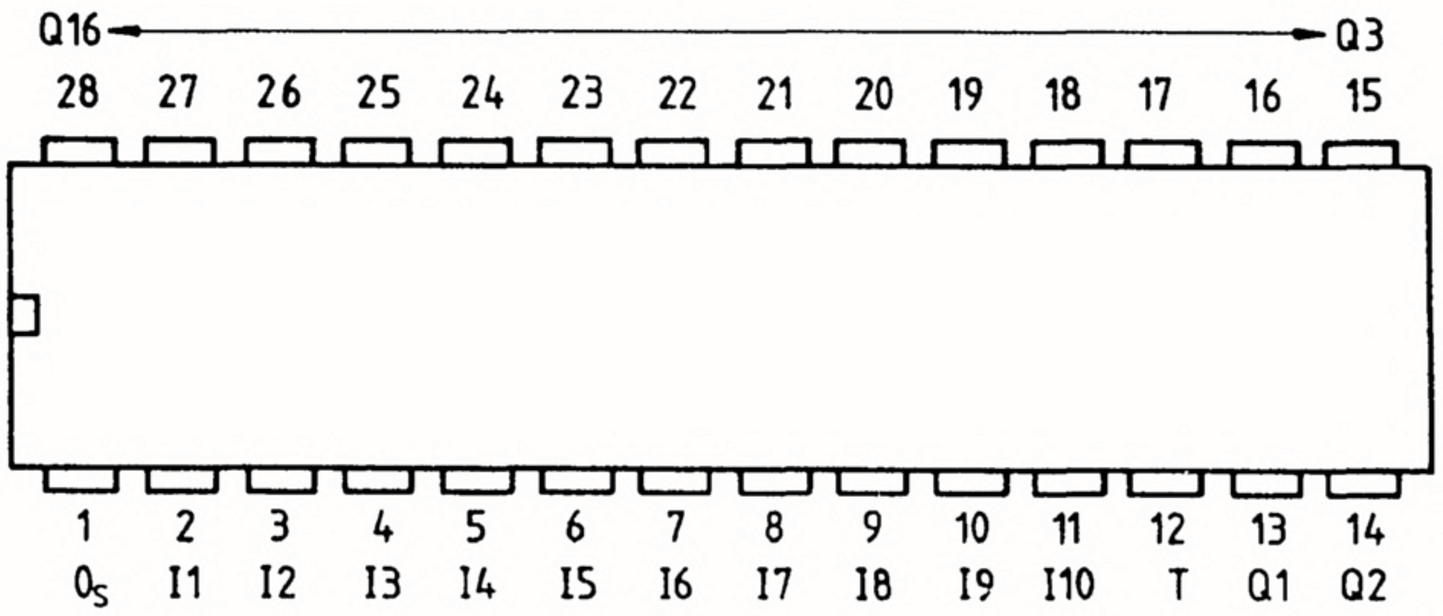
Programming conditions and simple programming circuit

Using the circuit shown, the matrix can be programmed in the following manner:

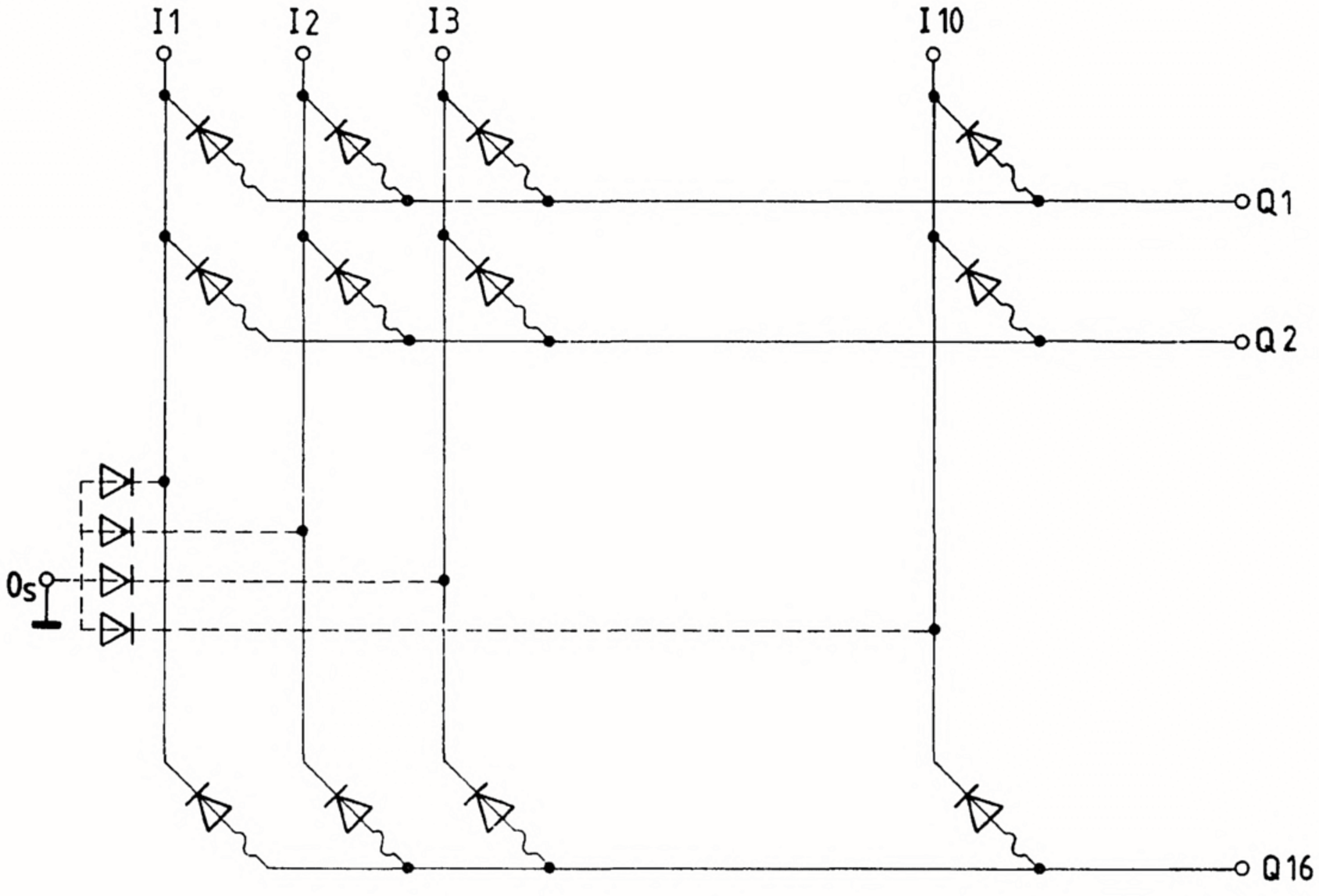
1. observe MOS handling
2. connect pin 0_S (substrate) to ground via a −2 V voltage source
3. connect desired input I to ground using switch S1
4. select desired output Q with switch S2
5. trigger programming process with button T3
6. the specified voltage source with 18 V to 20 V must be suited for a load of at least 300 Ω (fuse resistance), and must have a rise time from 0 V to 20 V of 1 µs
7. only one fuse may be programmed at a time
8. a current pulse duration of 5 ms to 10 ms is sufficient for programming.



Pin configuration
top view

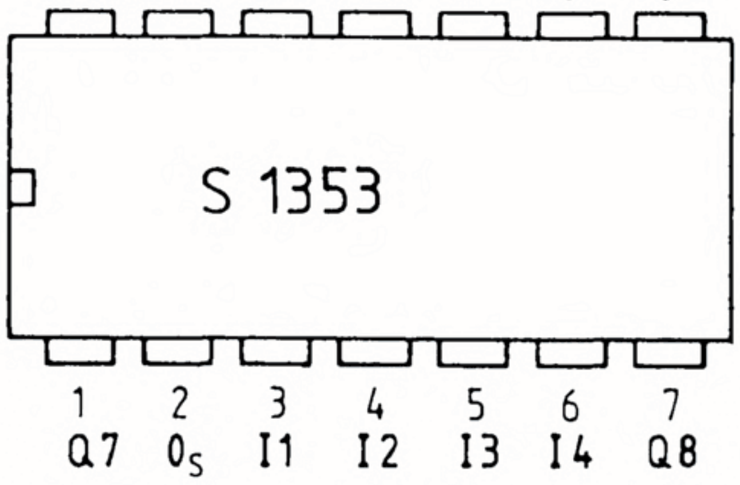


Circuit

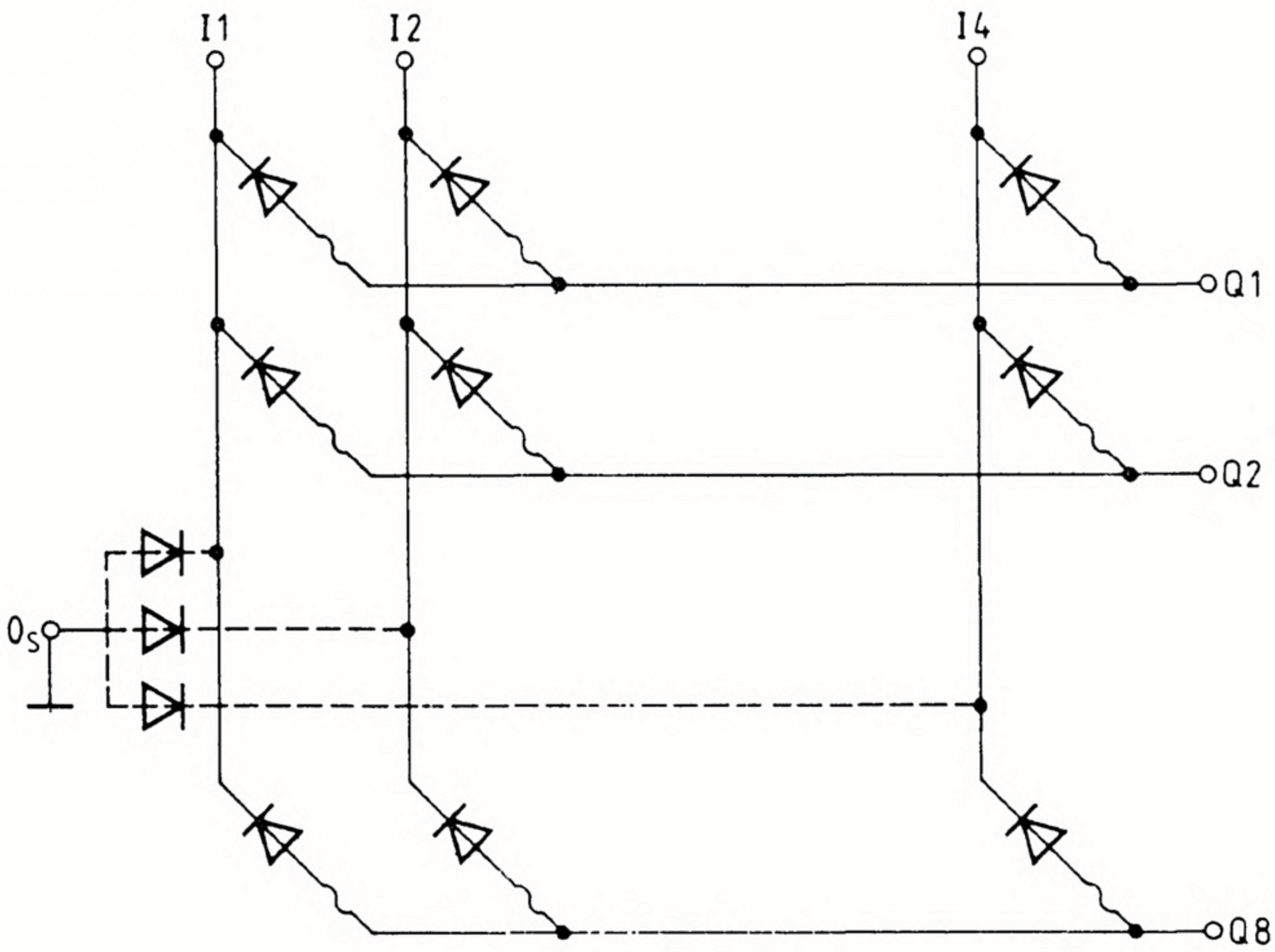


Note: Inputs must not be open $V_I < V_Q$
Test pin T must not be connected.

Pin configuration
(top view)



Circuit



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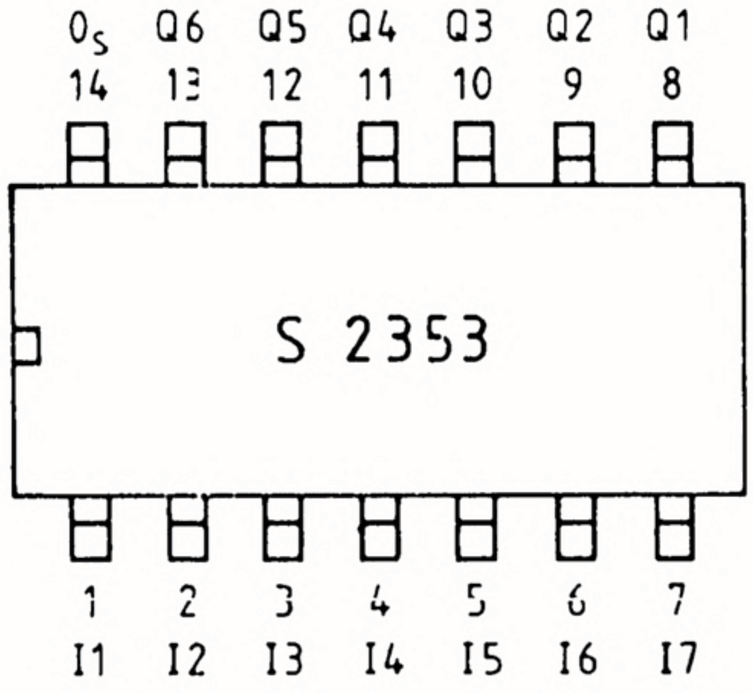
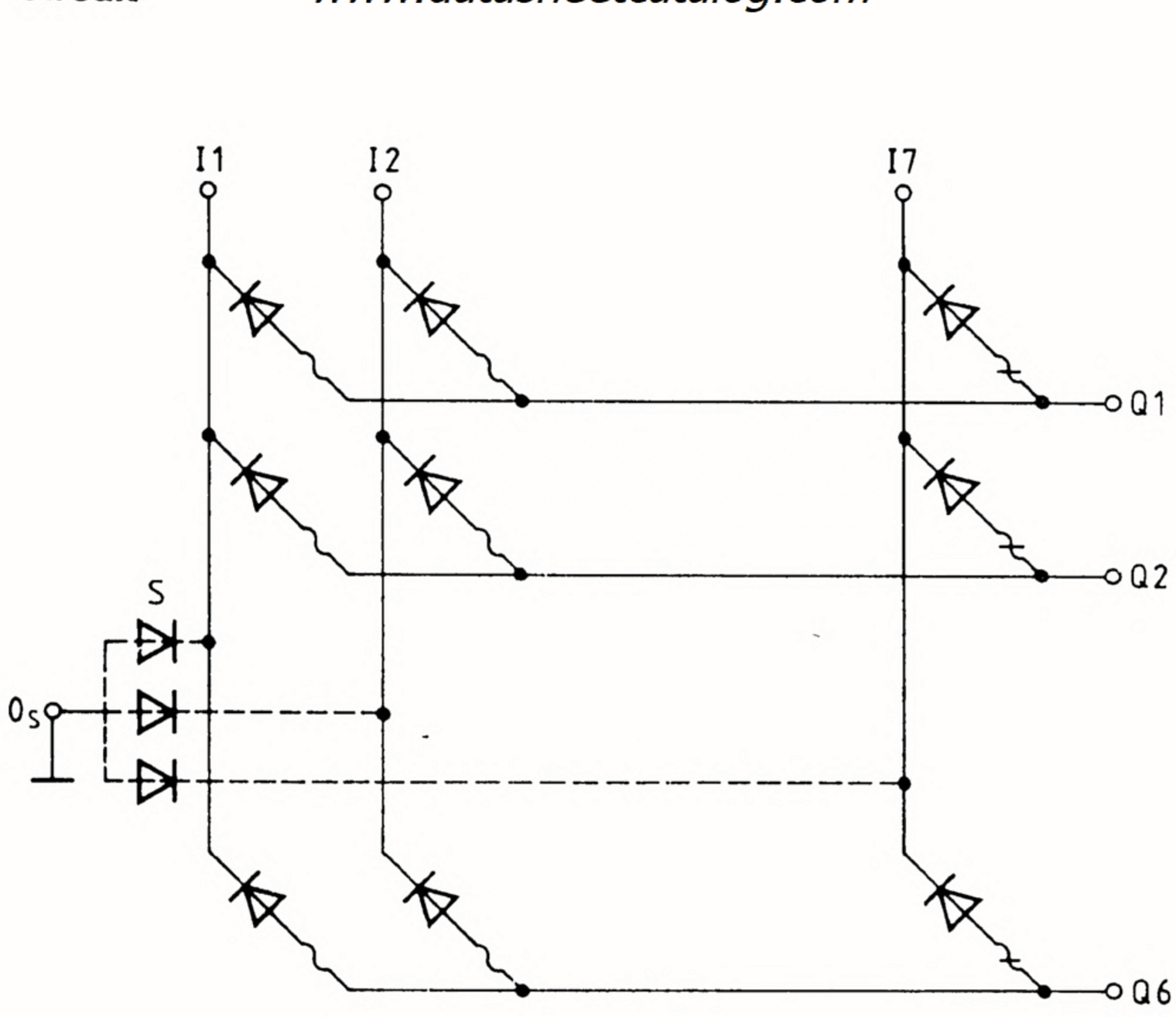
Pin configuration
(top view)



Circuit



Note: Inputs must not be open
$V_i < V_Q$
S = Substrate diodes