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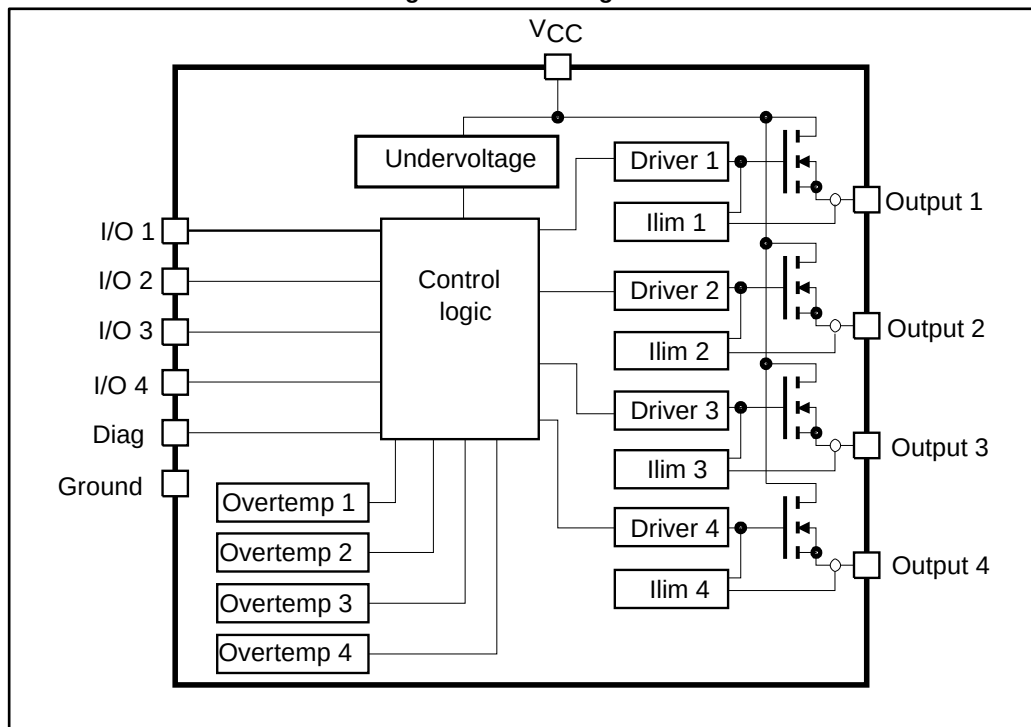
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1 Block diagram

Figure 1: Block diagram



2 Pin connection

Figure 2: Connection diagram (top view)

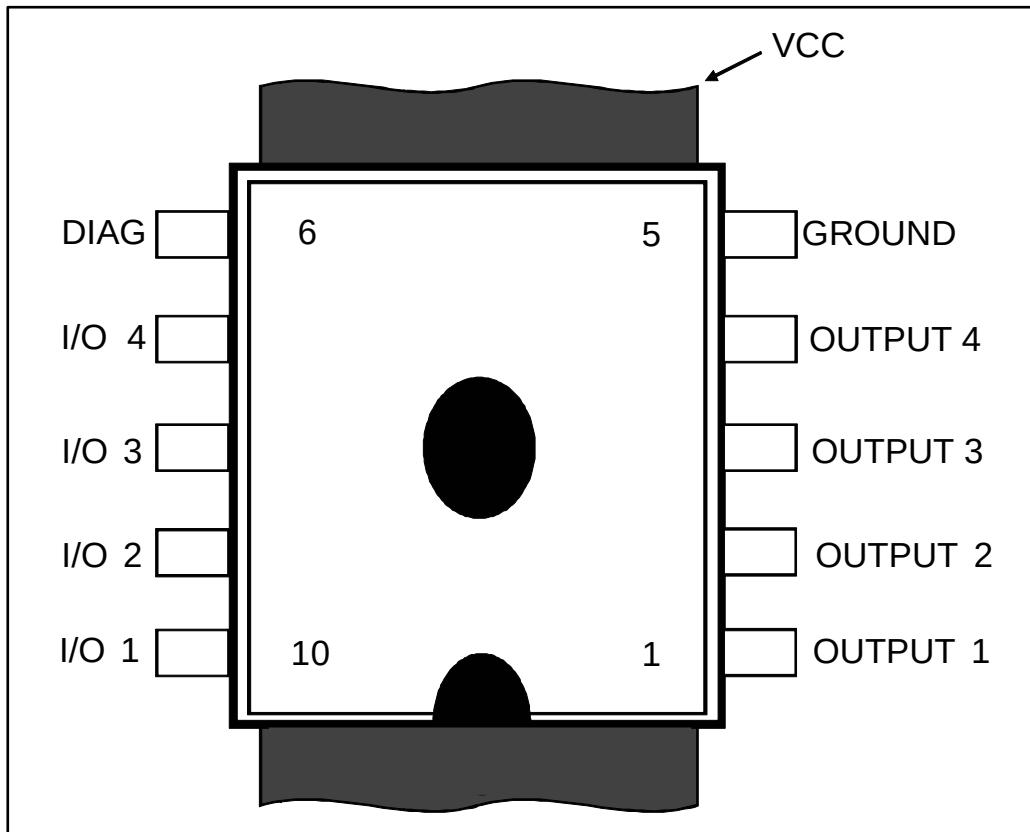
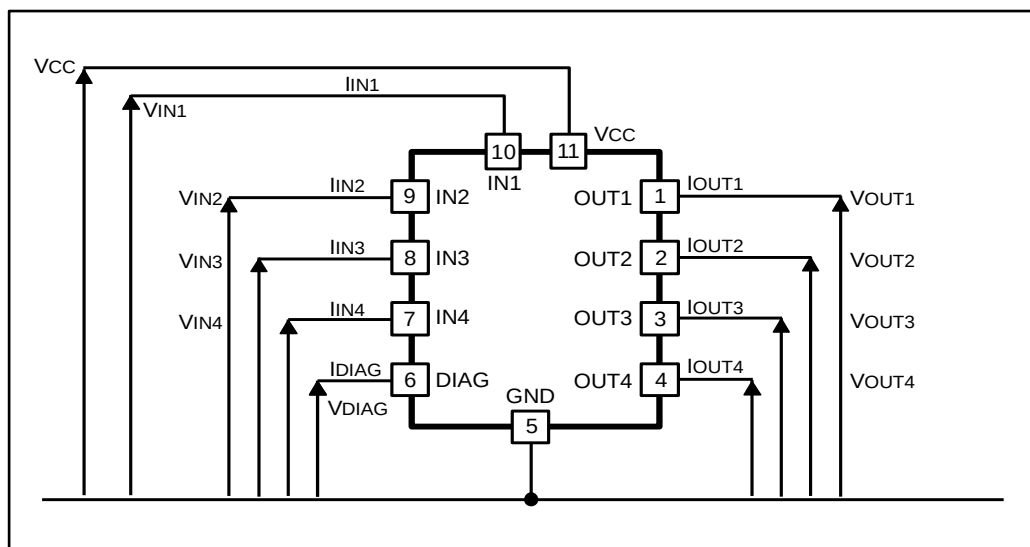


Figure 3: Current and voltage conventions



3 Maximum ratings

Table 2: Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CC}	Power supply voltage	45	V
$-V_{CC}$	Reverse supply voltage	-4	V
I_{OUT}	Output current	Internally limited	A
I_R	Reverse output current (per channel)	-6	A
I_{IN}	Input current range	-1 to +10	mA
I_{DIAG}	Diag pin current	-1 to +10	mA
V_{ESD}	Electrostatic discharge (R = 1.5 k Ω ; C = 100 pF)	2000	V
E_{AS}	Single pulse avalanche energy one channel active $T_J = 125^\circ$, $I_{LOAD} = 0.625$ A	10	J
	Single pulse avalanche energy all channel active simultaneously $T_J = 125^\circ$, $I_{LOAD} = 0.625$ A	2	J
P_{TOT}	Power dissipation at $T_C = 25^\circ\text{C}$	Internally limited	W
T_J	Junction operating temperature	Internally limited	$^\circ\text{C}$
T_{STG}	Storage temperature	-55 to 150	$^\circ\text{C}$

Table 3: Thermal data

Symbol	Parameter		Value	Unit
$R_{th(JC)}$	Thermal resistance junction-case ⁽¹⁾	Max.	3	$^\circ\text{C/W}$
$R_{th(JA)}$	Thermal resistance junction-ambient ⁽²⁾	Max.	50	$^\circ\text{C/W}$

Notes:⁽¹⁾Per channel.⁽²⁾When mounted on a four-layer FR4, with the minimum recommended pad size.

4 Electrical characteristics

10 V < V_{CC} < 36 V; -40 °C < T_J < 125 °C; unless otherwise specified

Table 4: Power section

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V _{CC}	Supply voltage		10		36	V
R _{DS(on)}	On-state resistance	I _{OUT} = 0.5 A at T _J = 25 °C			0.2	Ω
		I _{OUT} = 0.5 A at T _J = 85 °C			0.32	
		I _{OUT} = 0.5 A at T _J = 125 °C			0.4	
I _S	Supply current	All channels in OFF-state, V _{IN} = 30 V, I _{OUT} = 0 V, T _J = 125 °C			1	mA
					6	mA
V _{OL}	Low state output voltage	V _{IN} = V _{IL} ; R _{LOAD} > = 10 MΩ			1.5	μA
I _{LGND}	Output current at turn-off	V _{CC} = V _{IN} = V _{GND} = V _{STAT} = 18 to 30 V T _A = - 25 °C to 85 °C			2	mA
V _{demag}	Output current at turn-off	I _{OUT} = 0.5 A; L _{LOAD} >= 1 mH	V _{CC} -65	V _{CC} -55	V _{CC} -45	V

Table 5: Switching (V_{CC} = 24 V, T_J = 25 °C)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t _{d(ON)}	Turn-on delay time	I _{OUT} = 0.5 A, resistive load, input rise time < 0.1 μs		52	100	μs
t _r	Rise time of output current	I _{OUT} = 0.5 A, resistive load, input rise time < 0.1 μs		94	250	μs
t _{d(OFF)}	Turn-off delay time of output current	I _{OUT} = 0.5 A, resistive load, input rise time < 0.1 μs		34	50	μs
t _f	Fall time	I _{OUT} = 0.5 A, resistive load, input rise time < 0.1 μs		8	20	μs

Table 6: Logic inputs

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{IL}	I/O input low level voltage				2	V
V_{IH}	I/O input high level voltage		3.5			V
$V_{I(HYST)}$	I/O input hysteresis voltage			0.5		V
I_{IN}	I/O input current	$V_{IN} = 30\text{ V}$			25	μA
V_{ICL}	I/O input clamp voltage ⁽¹⁾	$I_{IN} = 1\text{ mA}$	32	36		V
		$I_{IN} = -1\text{ mA}$		-0.7		V

Notes:

⁽¹⁾The input voltage is internally clamped at 32 V minimum, the input pins can be connected to a higher voltage by an external resistor, which cannot exceed 10 mA

Table 7: Protection and diagnostic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{DIAG}^{(1)}$	Status voltage output low	$I_{DIAG} = 5\text{ mA}$ (fault condition)			1	V
V_{SCL}	Status clamp voltage	$I_{DIAG} = 1\text{ mA}$	32	36 -0.7		
V_{USD}	Undervoltage shutdown		5		8	V
I_{lim}	DC short-circuit current	$V_{CC} = 24\text{ V}$; $R_{LOAD} < 10\text{ m}\Omega$	1		2	A
I_{OVPK}	Peak short-circuit current	$V_{CC} = 24\text{ V}$; $V_{IN} = 30\text{ V}$; $R_{LOAD} < 10\text{ m}\Omega$			4	V
I_{DIAGH}	Leakage on DIAG pin in high state	$V_{DIAG} = 24\text{ V}$			25	μA
I_{LOAD}	Output leakage current	$V_{CC} = 10\text{ to }36\text{ V}$; $V_{IN}=V_{IL}$			50	μA
t_{SC}	Delay time of current limiter				100	μs
T_{TSD}	Junction shutdown temperature		150	170		$^{\circ}\text{C}$
T_R	Junction reset temperature		135	155		$^{\circ}\text{C}$

Notes:

⁽¹⁾Status determination > 100 μs after the switching edge.



If the INPUT pin is left floating, the corresponding channel automatically switches off. If GND pin is disconnected, the channel switches off provided that V_{CC} does not exceed 36 V.

5 Test circuits

Figure 4: Avalanche energy test circuit

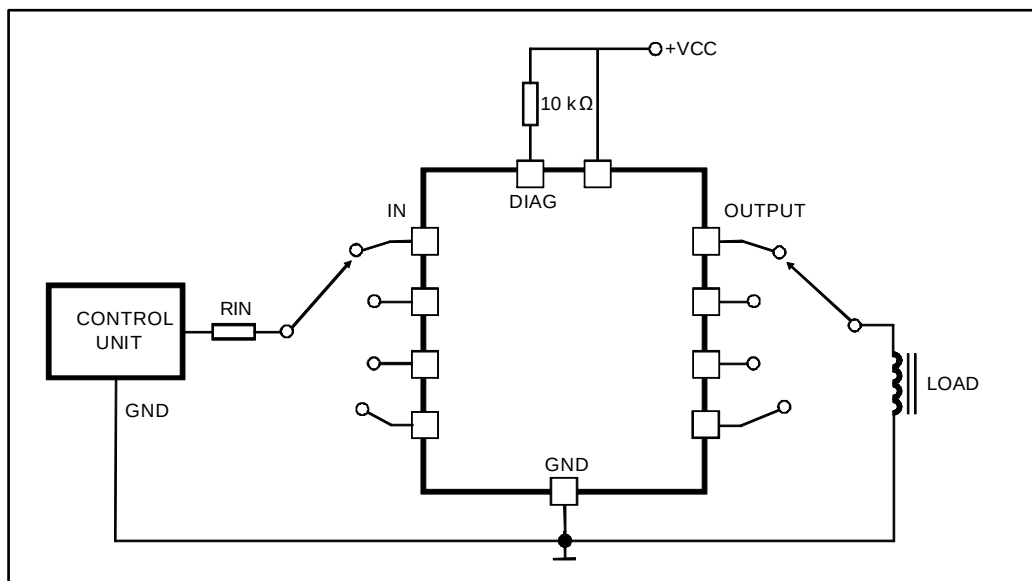


Figure 5: Peak short-circuit test diagram

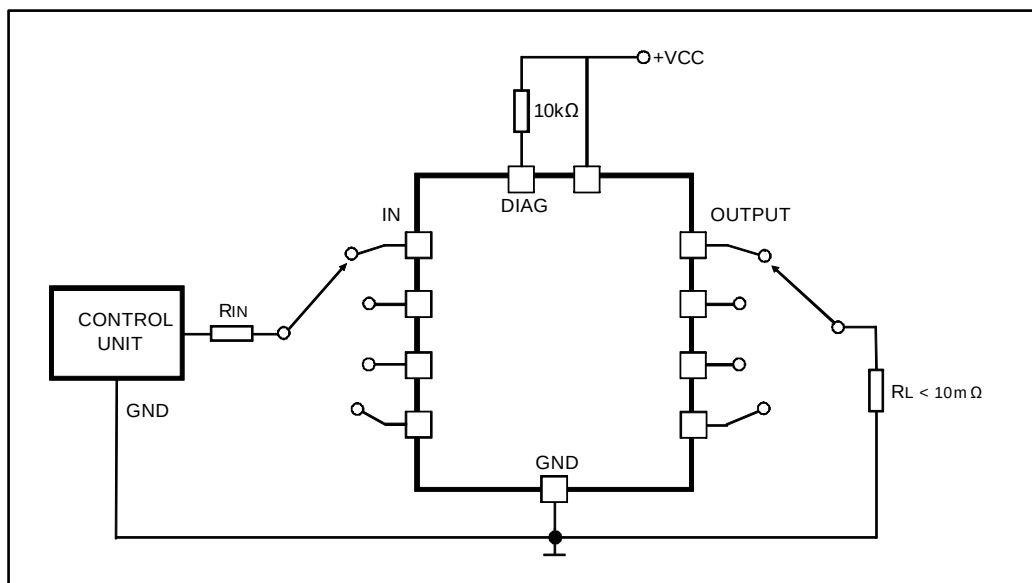
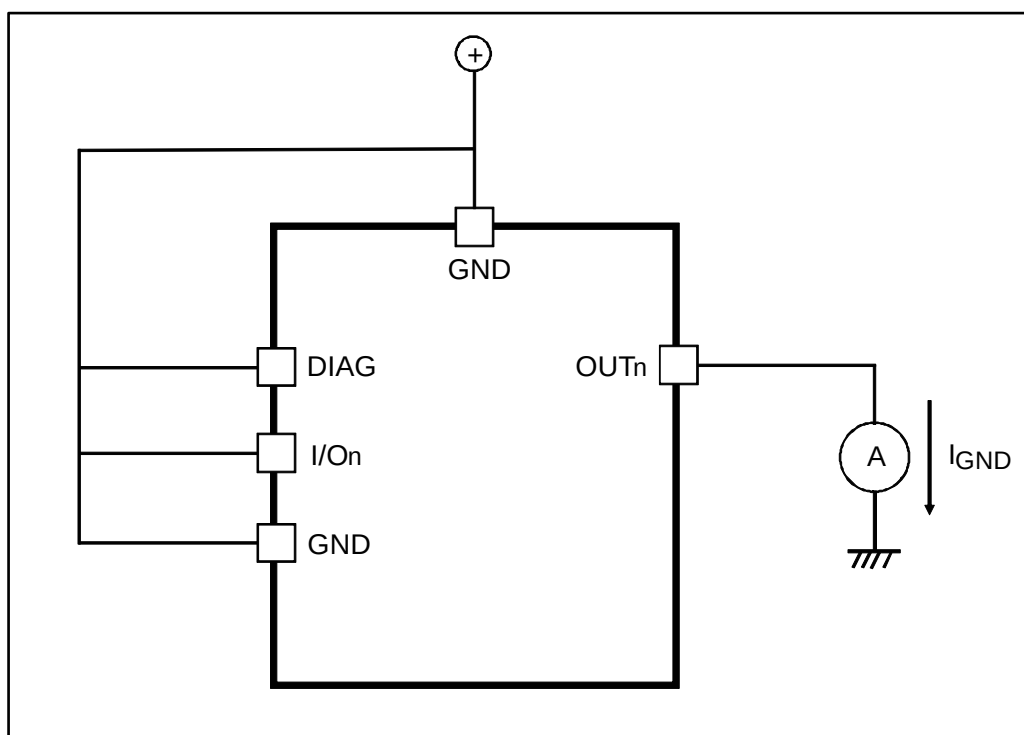


Figure 6: I_{LGND} test configuration

6 Switching time waveforms and truth table

Figure 7: Switching waveforms

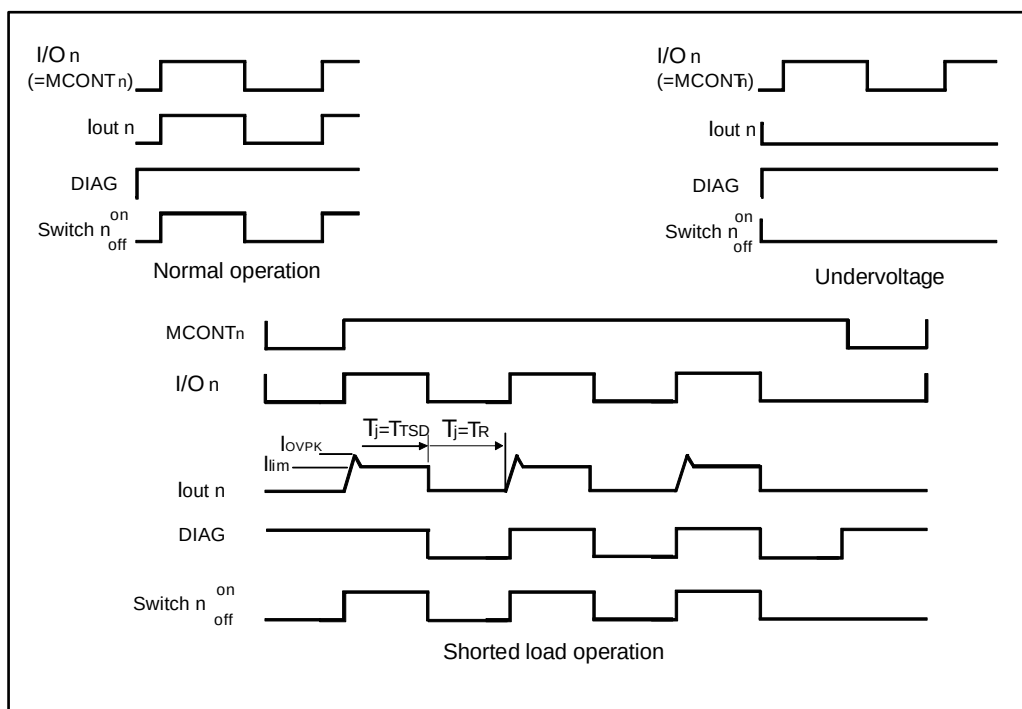


Figure 8: Switching parameter test conditions

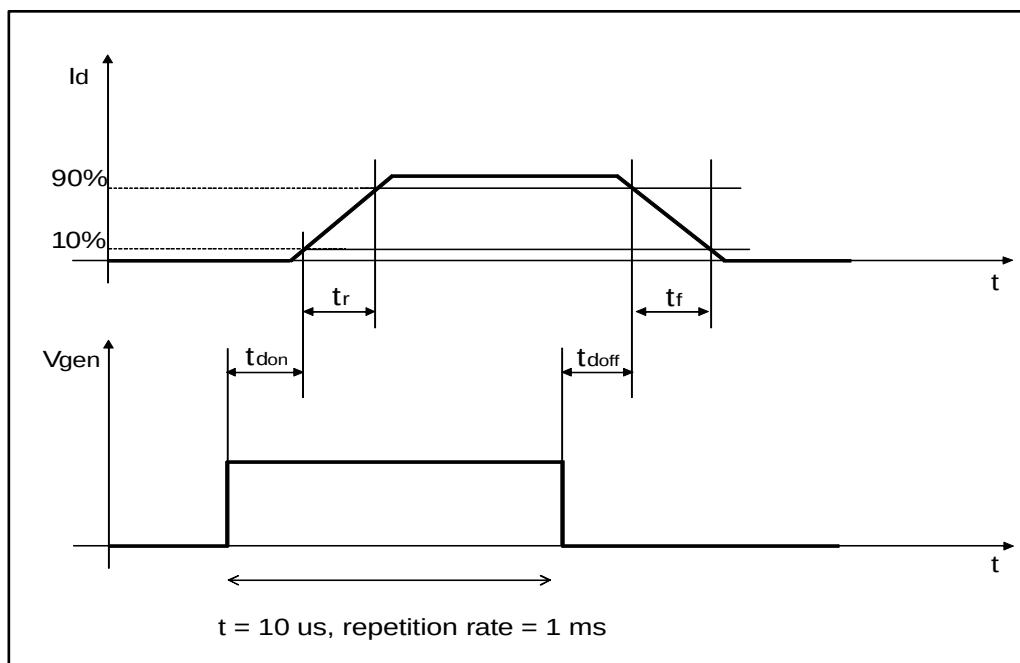
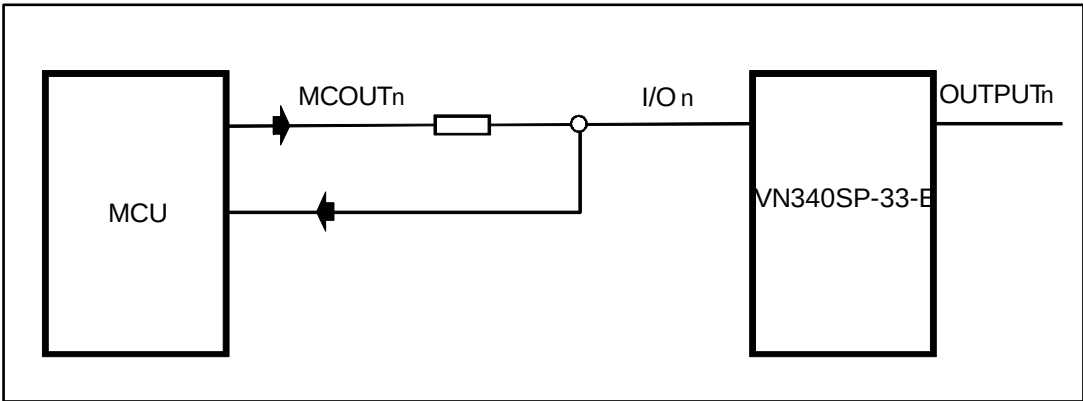


Table 8: Truth table

Conditions	MCOUTn	I/O n	OUTPUTn	Diagnostic
Normal operation	L	L	L	H
	H	H	H	H
Junction overtemperature	L	L	L	H
	H	L	L	L
Undervoltage	L	L	L	H
	H	H	L	H
Shorted load current limitation	L	L	L	H
	H	H	H	H

Figure 9: Driving circuit



7 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK[®] is an ST trademark.

7.1 PowerSO-10 package information

Figure 10: PowerSO-10 package outline

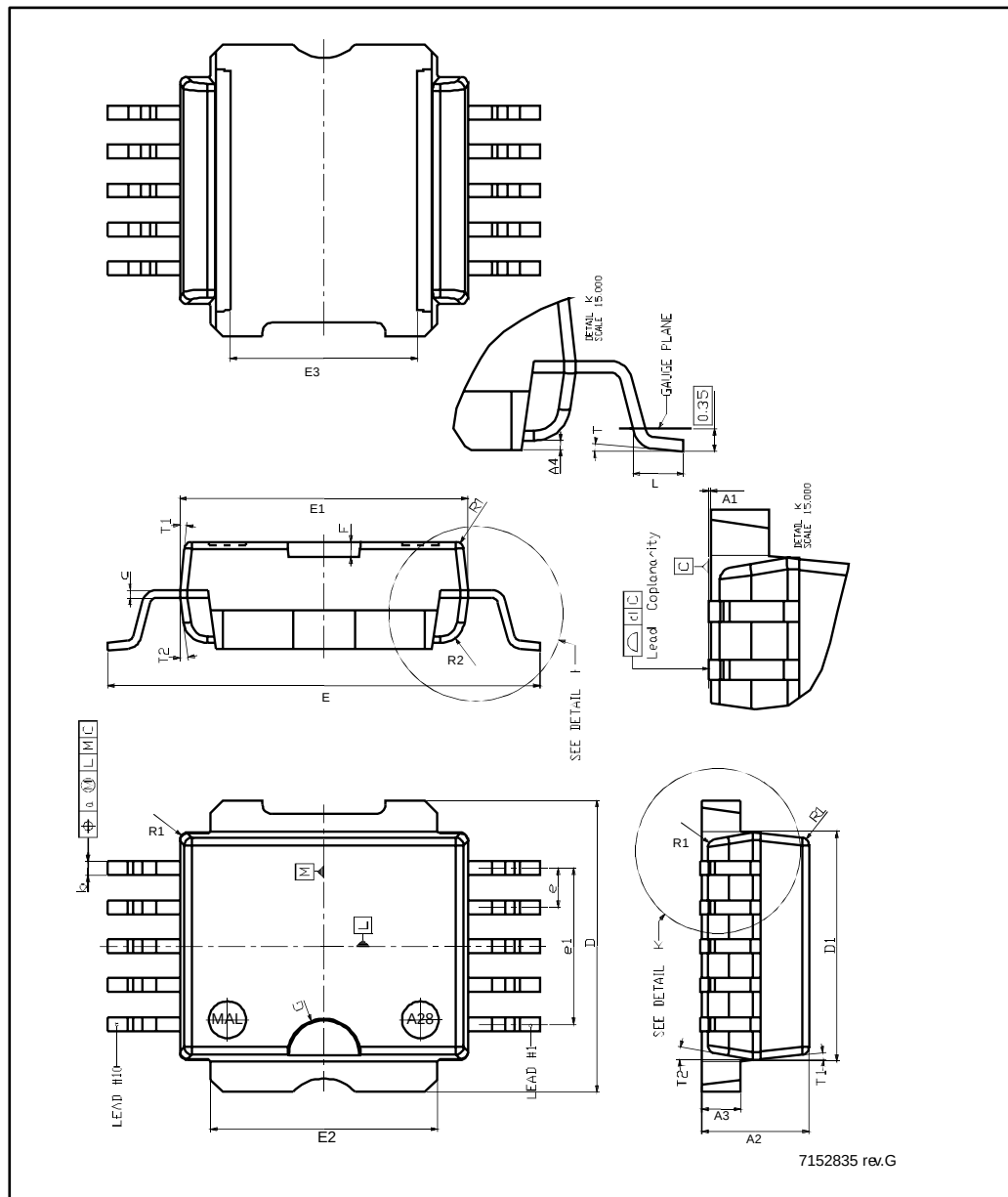


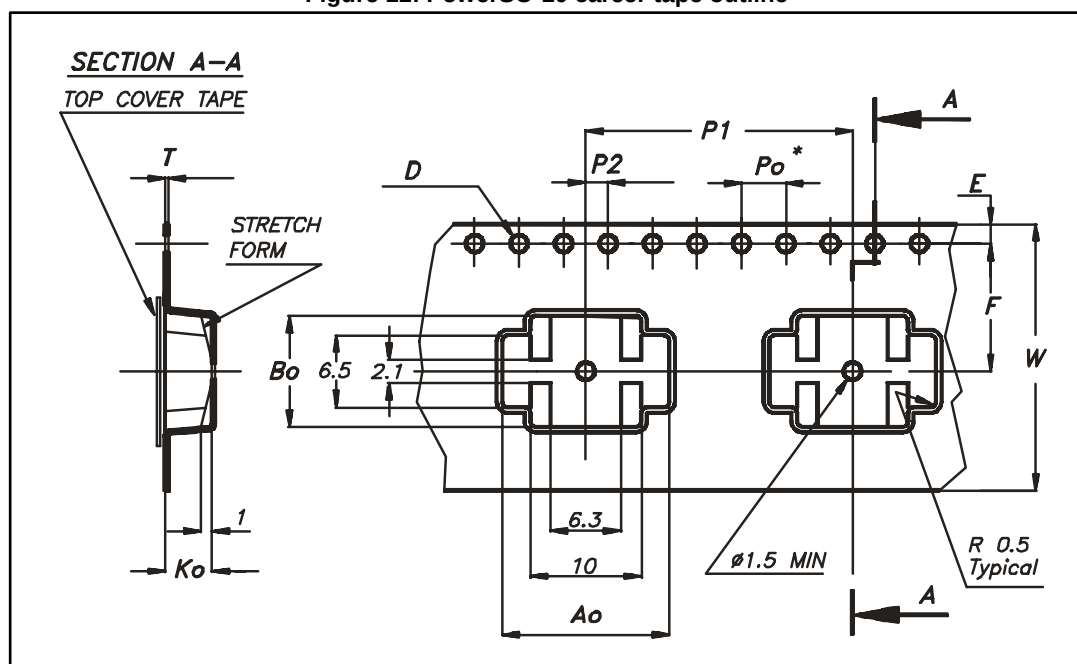
Table 9: PowerSO-10 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A1	0.01	0.05	0.08
A2	3.45	3.5	3.55
A3	1.24	1.28	1.32
A4	0.15	0.2	0.25
a		0.2	
b	0.4	0.45	0.5
c	0.24	0.27	0.3
D	9.45	9.52	9.59
D1	7.42	7.5	7.58
d	0	0.04	0.09
E	13.9	14.1	14.3
E1 ^a	9.33	9.4	9.47
E2	7.4	7.42	7.5
E3	5.95	6.1	6.25
e	1.22	1.27	1.32
e1		5.08	
F		0.5	
G		1.2	
L	0.85	1	1.1
R1			0.25
R2		0.8	
T	3 deg	5 deg	7 deg
T1		6 deg	
T2		10deg	

^a Resin protrusions are not included (max. value: 0.15 mm per side).

7.2 PowerSO-10 packing information

Figure 11: PowerSO-10 career tape outline



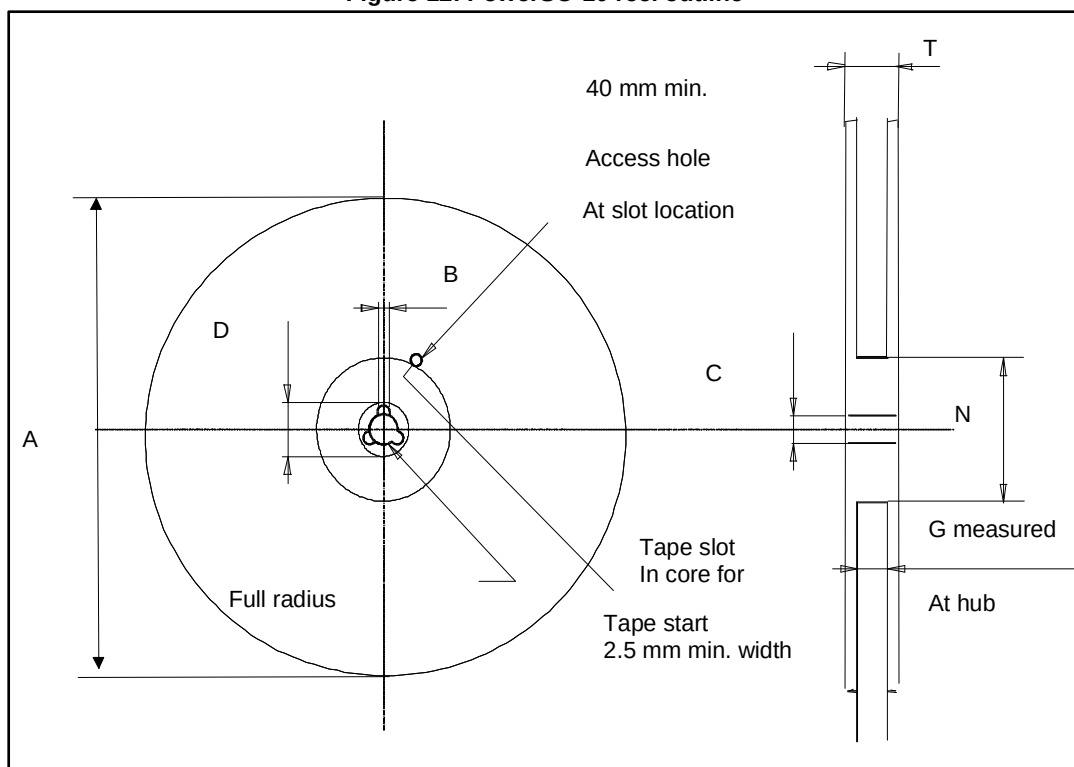
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Table 10: PowerSO-10 career tape dimension mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A0	14.9	15.0	15.1
B0	9.9	10.0	10.1
K0	4.15	4.25	4.35
F	11.4	11.5	11.6
E	1.65	1.75	1.85
W	23.7	24.0	24.3
P2	1.9	2.0	2.1
P0	3.9	4.0	4.1
P1	23.9	24.0	24.1
T	0.025	0.30	0.35
D(Ø)	1.50	1.55	1.60

10 sprocket hole pitch cumulative tolerance ± 0.2 mm

Figure 12: PowerSO-10 reel outline



Drawing is not in scale

Table 11: PowerSO-10 reel dimension mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
B	1.5		
C	12.8	13	13.2
D	20.2		
N	60		
G	23.7	24.4	
T			30.4



10 sprocket hole pitch cumulative tolerance ± 0.2 mm

Table 12: PowerSO-10 base and bulk quantity

Base quantity	Bulk quantity
600	600

8 Revision history

Table 13: Document revision history

Date	Revision	Changes
05-Sep-2005	1	Initial release.
19-Mar-2007	2	Document reformatted, typo in note 1.
22-Aug-2008	3	Updated table 9.
07-Sep-2015	4	Updated the table of absolute maximum ratings.

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