SGS-THOMSON MICROELECTRONICS

L9930

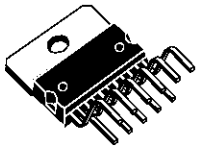
DUAL FULL BRIDGE

PRODUCT PREVIEW

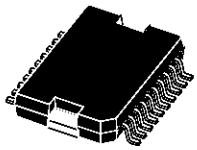
- $R_{DS\ ON}$ = 2Ω
- INTERNAL CLAMPING VOLTAGE = 32V
- INTERNAL FREE WHEELING DIODES
- PARALLEL DRIVE CAPABILITY
- RESISTIVE OR INDUCTIVE LOAD

PROTECTION:
- TEMPERATURE PROTECTION
- SHORT-CIRCUIT PROTECTION (V_{bat}, LOAD, GND)

DETECTION:
- SHORTED LOAD
- OPEN LOAD
- OVERTEMPERATURE



Multiwatt11



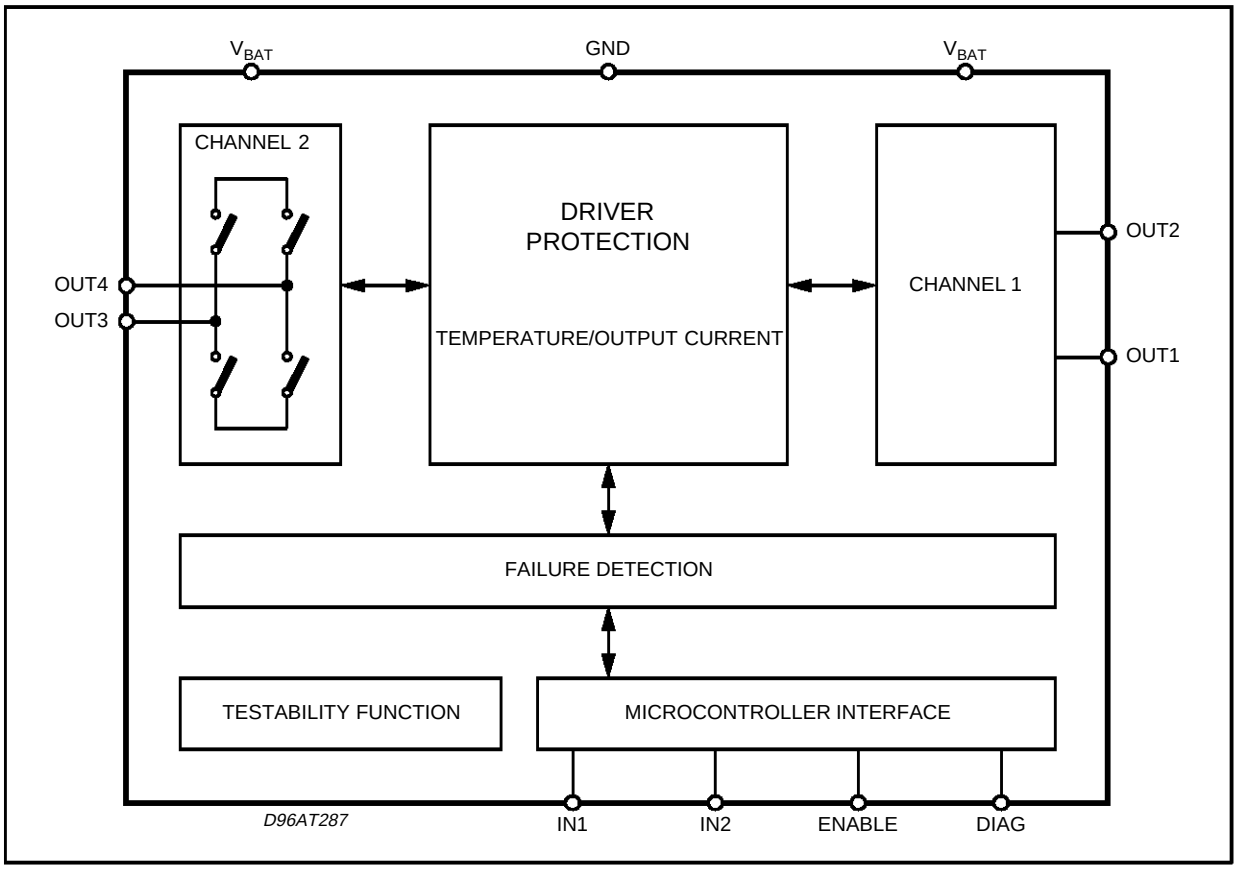
PowerSO20

ORDERING NUMBERS: L9930 (Multiwatt11)
L9930PD (PowerSO20)

DESCRIPTION

The L9930 is a dual full-bridge. The output stages are Power Mos switches.

BLOCK DIAGRAM

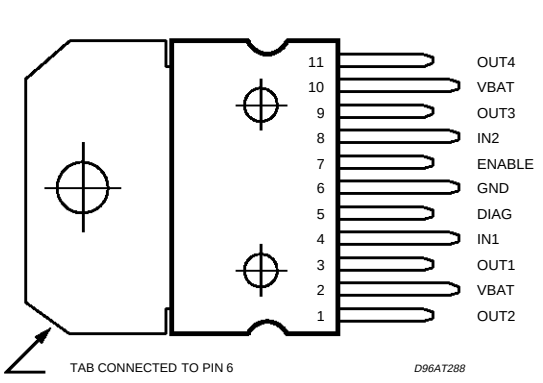


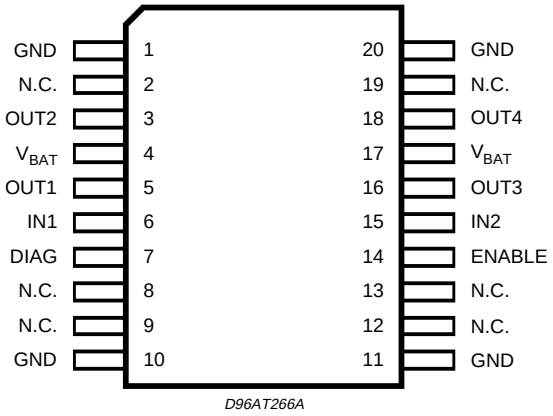
This is advanced information on a new product now in development or undergoing evaluation. Details are subject to change without notice.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
E	Clamped Energy at the Switching off	6 (max)	mJ
$V_{out\,DC}$	Continuous Output Voltage	24 (max)	V
$V_{out\,tr}$	Transient Output Voltage	32 (max)	V
$V_{bat\,DC}$	Continuous Battery Voltage	8 to 24	V
$V_{bat\,tr}$	Transient Battery Voltage	45 (max)	V
I_{out}	Reverse Output Current	– 2 (max)	A
f_{in}	Input Frequency	500 (max)	Hz
V_{in}	Input Voltage	– 0.3 to +7	V
V_{diag}	Diagnostic Voltage	– 0.3 to +7	V
T_s	Storage Temperature	– 55 to 150	°C
T_j	Operating Junction Temperature	– 40 to 150	°C
V_{ESD}	V_{ESD} (Note MIL STD 883C)	3000	V

PIN CONNECTION

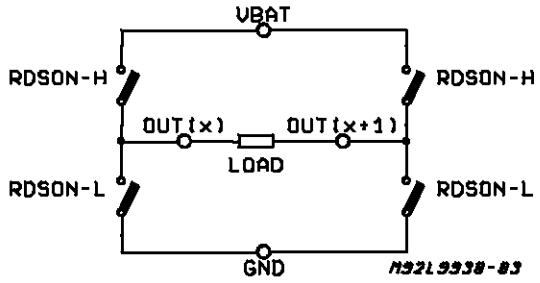




PIN FUNCTIONS

MW11	PowerSO20	Name	Function
1	3	OUT 2	Output Channel 1
2	4	V_{BAT}	Power Supply
3	5	OUT 1	Output Channel 1
4	6	IN 1	Input Channel 1
5	7	DIAG	Diagnostic Output Common for the 2 Channels
6	1, 10, 11, 20	GND	Ground
7	14	ENABLE	Enable
8	15	IN 2	Input Channel 2
9	16	OUT 3	Output Channel 2
10	17	V_{BAT}	Power Supply
11	18	OUT 4	Output Channel 2
	2, 8, 9, 12, 13, 19	NC	Not Connected

H - BRIDGE CONFIGURATION



THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction to Case	max.		°C/W
$R_{th\ j\text{-}amb}$	Thermal resistance Junction to Ambient	max.		°C/W

ELECTRICAL CHARACTERISTICS (V_{bat} = 8 to 18V tJ = – 40 to +150°C, unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_{DSon-H}	ON Resistance	I_{out} = 0.5A		2	4.3	Ω
R_{DSon-L}	ON Resistance	I_{out} = 0.5A		2	4.3	Ω
V_{OCL}	Clamping Voltage	I_{out} = 0.1A		32		V
V_F	Clamp Diode Forward Voltage	I_{out} = 0.5A		1.3		V
T_R	Output Voltage Rise Time	V_{out}; 0.1 to 0.9 V_{out} (see fig. 1) NOT LOADED		50	100	µs
T_F	Output Voltage Fall Time	Vout; 0.9 to 0.1 V_{out} (see fig. 1) NOT LOADED		50	100	µs
T_{DR}	Input to Output Rising edge Delay	0.5 V_{IN} to 0.1 V_{out} (see fig. 1) NOT LOADED			50	µs
T_{DF}	Input to Output Falling Edge Delay	0.5 VIN to 0.9 V_{out} (see fig. 1) NOT LOADED			50	µs

OUTPUT PROTECTIONS CHARACTERISTICS

I_{SC}	Short Circuit Typical Application (see fig 2)	T_{amb} = -40°C	0.45		2.6	A
		T_{amb} = 25°C	0.38		2.6	A
		T_{amb} = 125°C	0.28		2.6	A
I_{SC}	Short Circuit Typical Application with Shottky Diodes (see fig 3)		0.8		2.6	A
T_{SD}	Temperature		160			°C
T_{HYST}	Temperature Hysteresis			20		°C

These protections switch off the full bridge.

OUTPUT DETECTIONS CHARACTERISTICS

R_{OPL-L}	Open-load Threshold Resistor		80			Ω
R_{OPL-H}			100			Ω

SUPPLY CHARACTERISTICS

I_{QHI}	Supply Current	$R_{LOAD1} = R_{LOAD2} = \infty$ V_{BAT} = 14V, IN1 = IN2 = ENABLE = 5V			15	mA
I_{QLO}		$R_{load1} = R_{load2}$ = 50Ω V_{BAT} = 12V, ENABLE = 0V IN1 = IN2 = 0V			0.5	mA

ELECTRICAL CHARACTERISTICS

INPUTS CHARACTERISTICS (normal and standby mode)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{IH}	High Threshold				4	V
V_{IL}	Low Threshold		1			V
I_{NHI}	Input Current 1	V_{IN} = 4V			200	µA
I_{NLO}	Input Current 2	V_{IN} = 1V			50	µA

DIAGNOSTIC CHARACTERISTICS

V_{DIAGL}	Low Level Voltage	I_{DIAG} = 2mA		0.6	0.8	V
I_{DIAGH}	Leakage Current	V_{DIAG} = 5.25V		5	10	µA

INITIALIZATION CHARACTERISTICS

T_{INIT}	Initialization Timing	V_{BAT} = 12V	10			µs
T_{STUP}	Start-Up Timing	V_{BAT} = 12V	1			ms
T_{RESET}	Reset		10			µs

FILTER CHARACTERISTICS

T_{FILTER}			64	112	170	µs
T_{DIAG}			4	6	10	µs
T_{SYNC}			4	6	10	µs

TRUE TABLE

ENAB	IN1	IN2	OUT1	OUT2	OUT3	OUT4	MODE	DIAG
0	0	0	HZ	HZ	HZ	HZ	STANDBY	?
0	0	1	HZ	HZ	HZ	HZ	NORMAL	?
0	1	0	HZ	HZ	HZ	HZ	NORMAL	?
0	1	1	HZ	HZ	HZ	HZ	NORMAL	?
1	0	0	HSD	LSD	HSD	LSD	NORMAL	VALID
1	0	1	HSD	LSD	LSD	HSD	NORMAL	VALID
1	1	0	LSD	HSD	HSD	LSD	NORMAL	VALID
1	1	1	LSD	HSD	LSD	HSD	NORMAL	VALID

Figure 1:

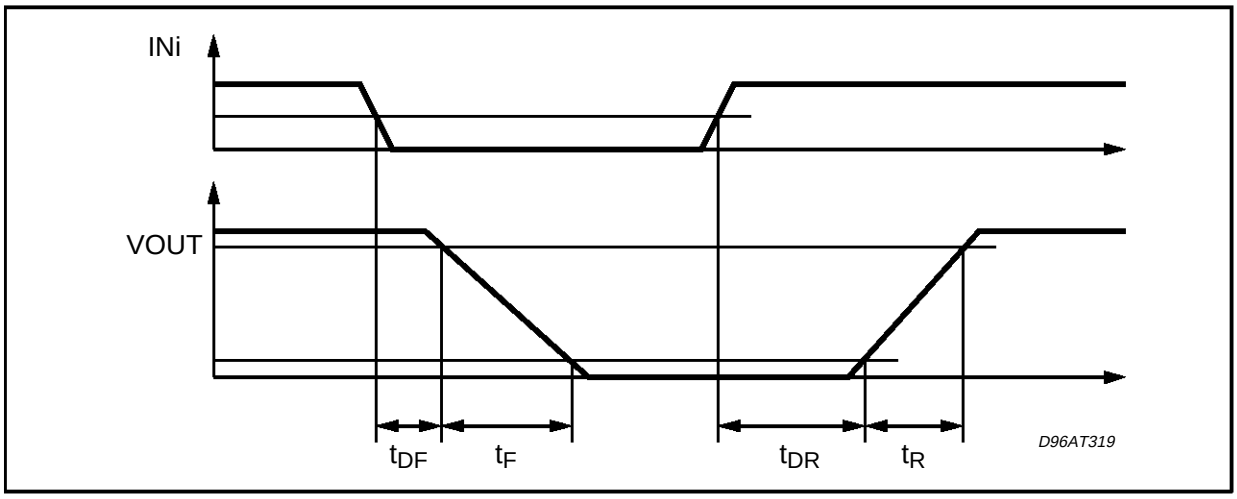


Figure 2: Typical Application

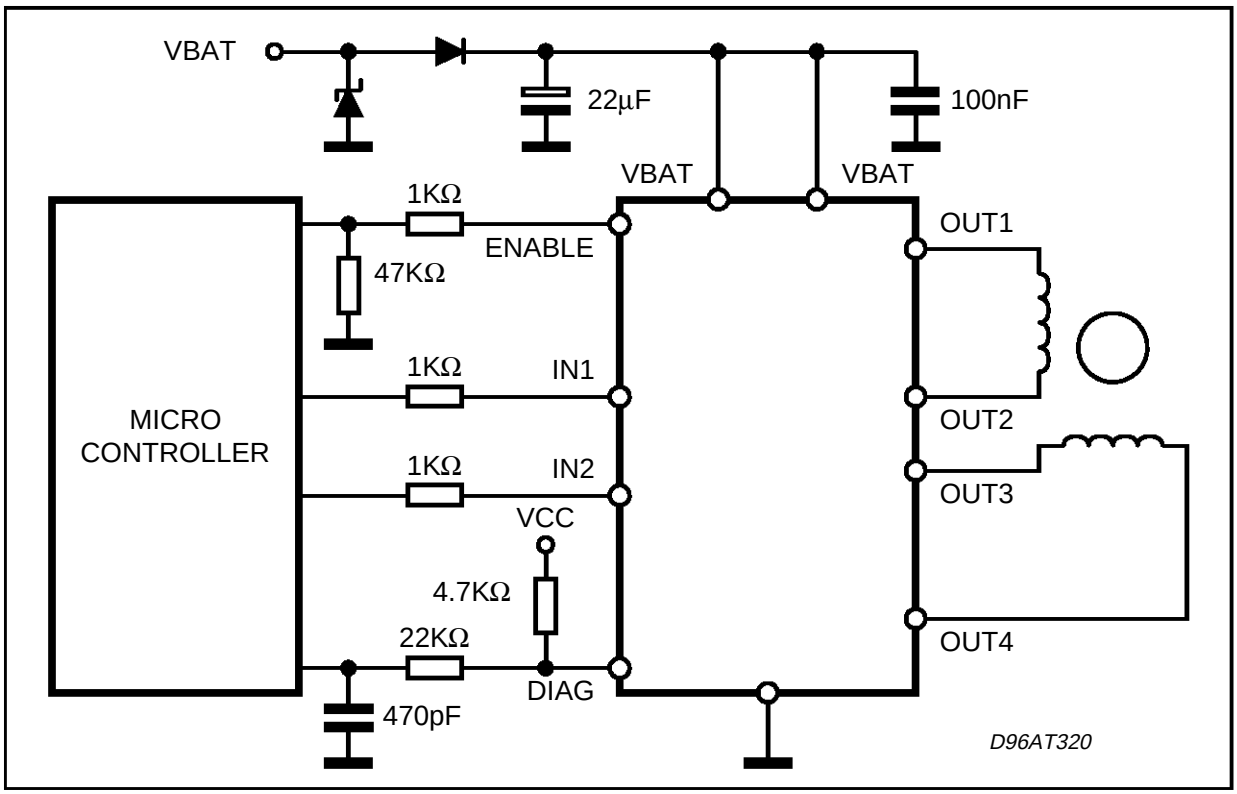


Figure 3: Typical Application with Shottky Diodes

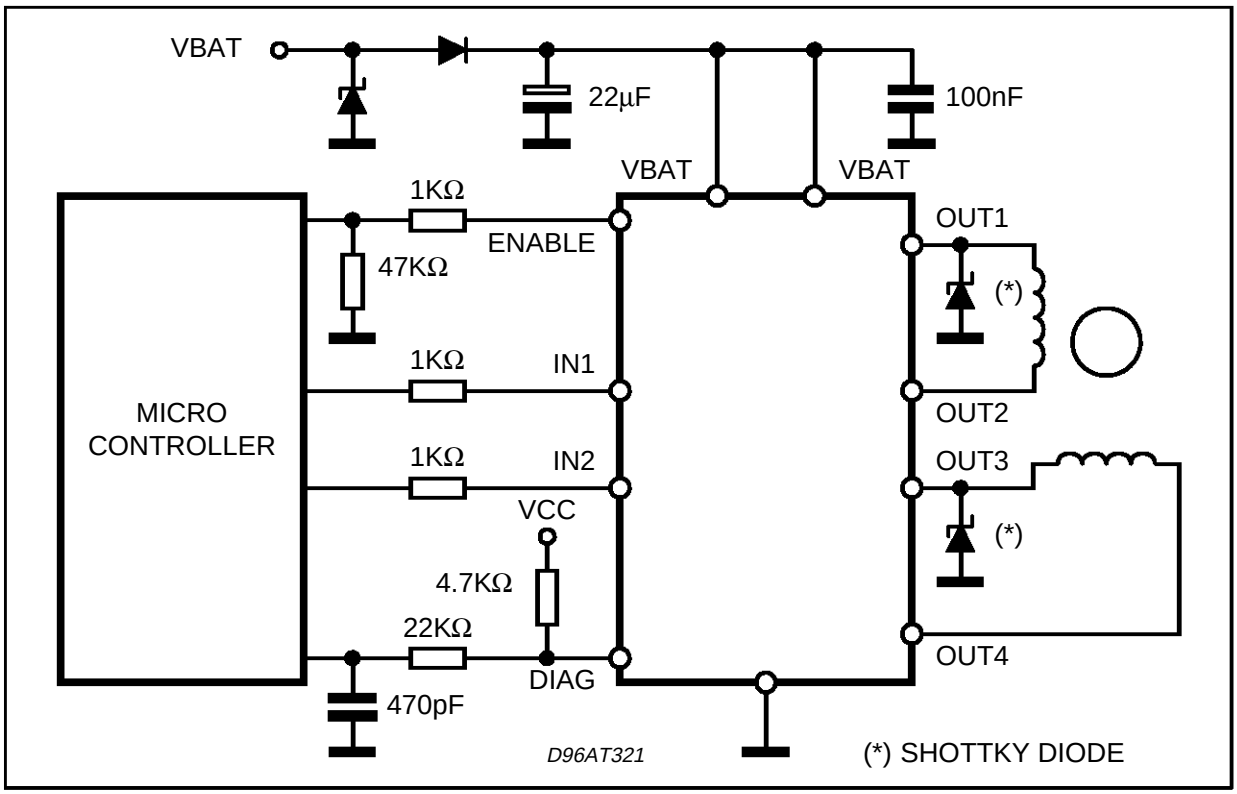


Figure 4: Initialization.

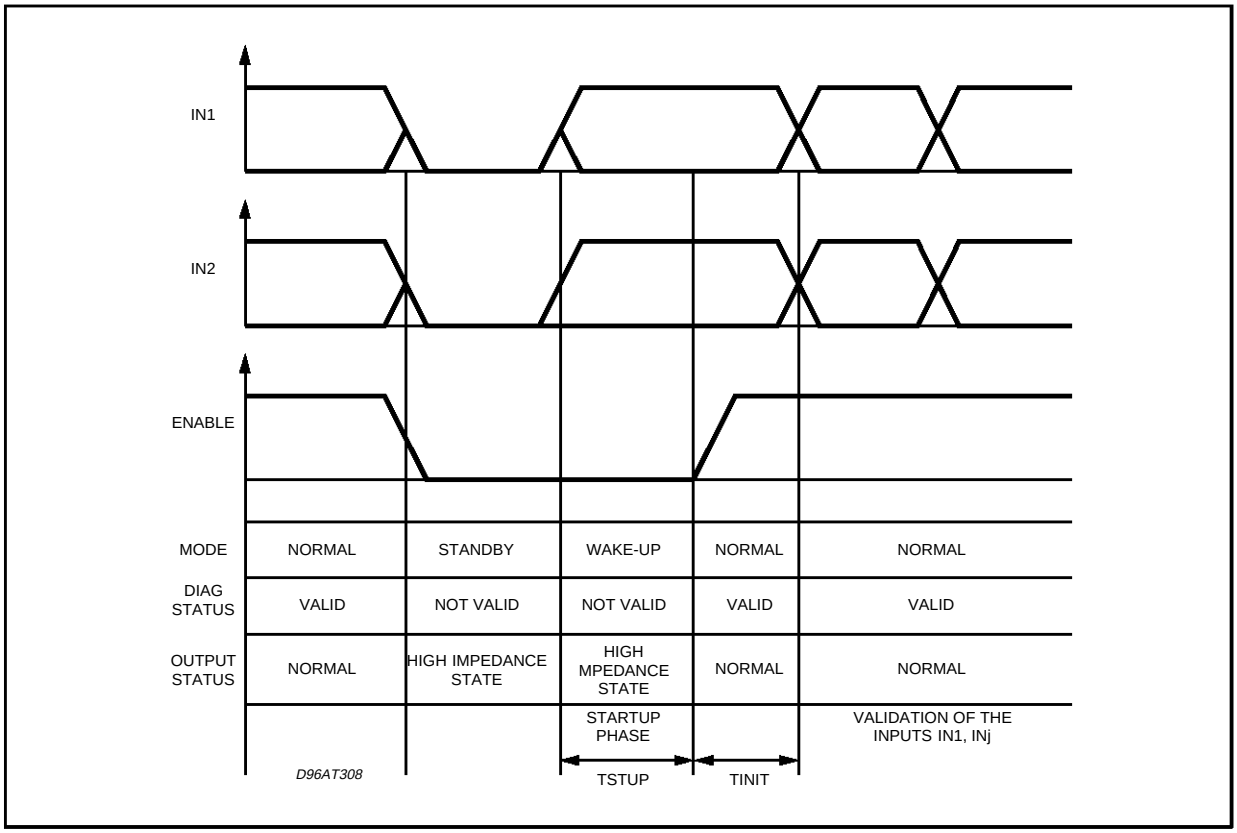


Figure 5: Normal Condition.

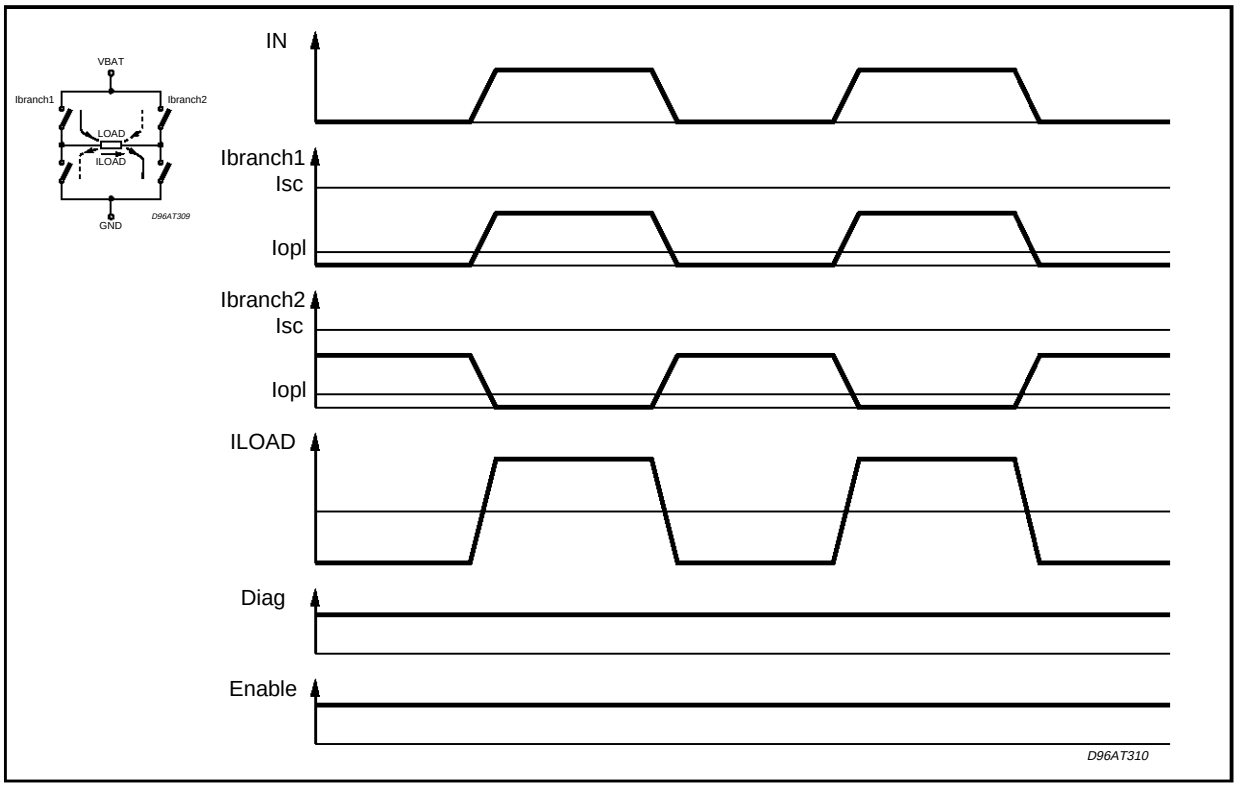


Figure 6: Short-circuit Condition.

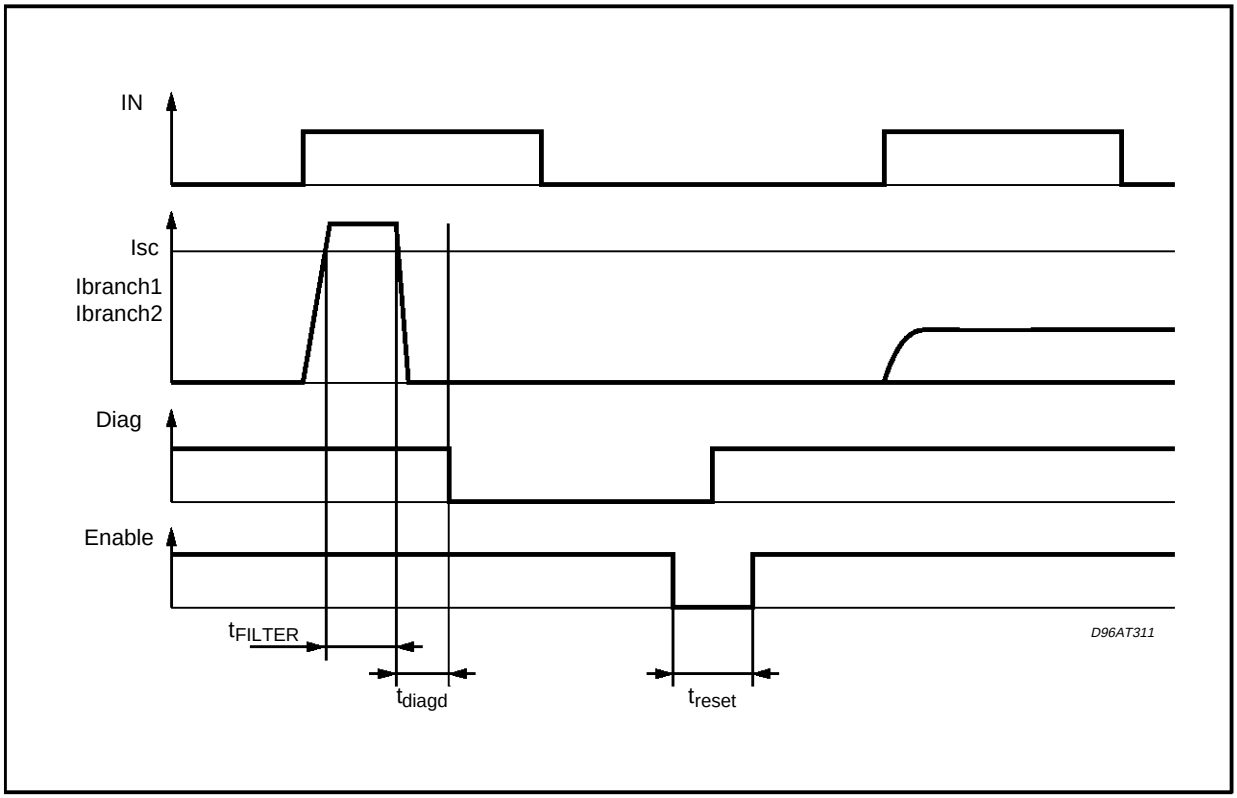


Figure 7: short circuit condition: no detection (NOT TESTED)

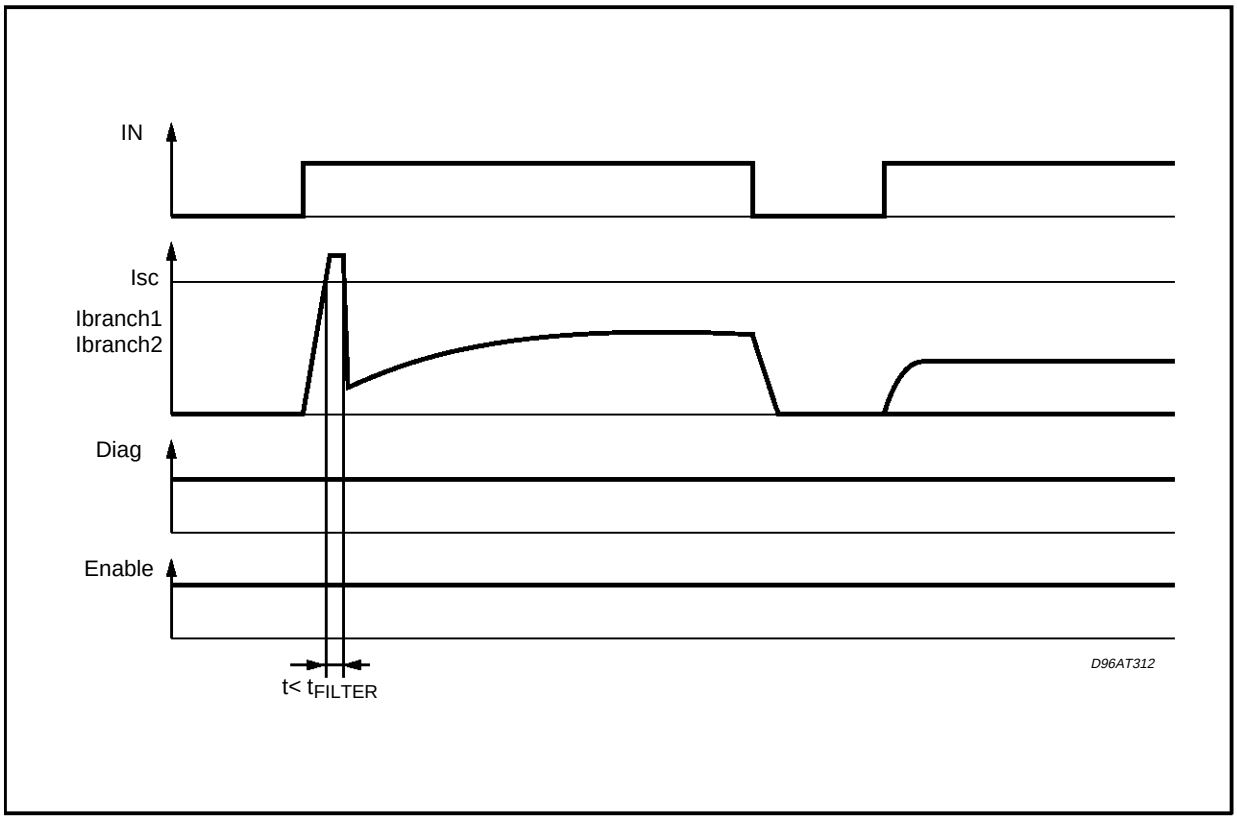


Figure 8: Open Load Condition 1: Detection

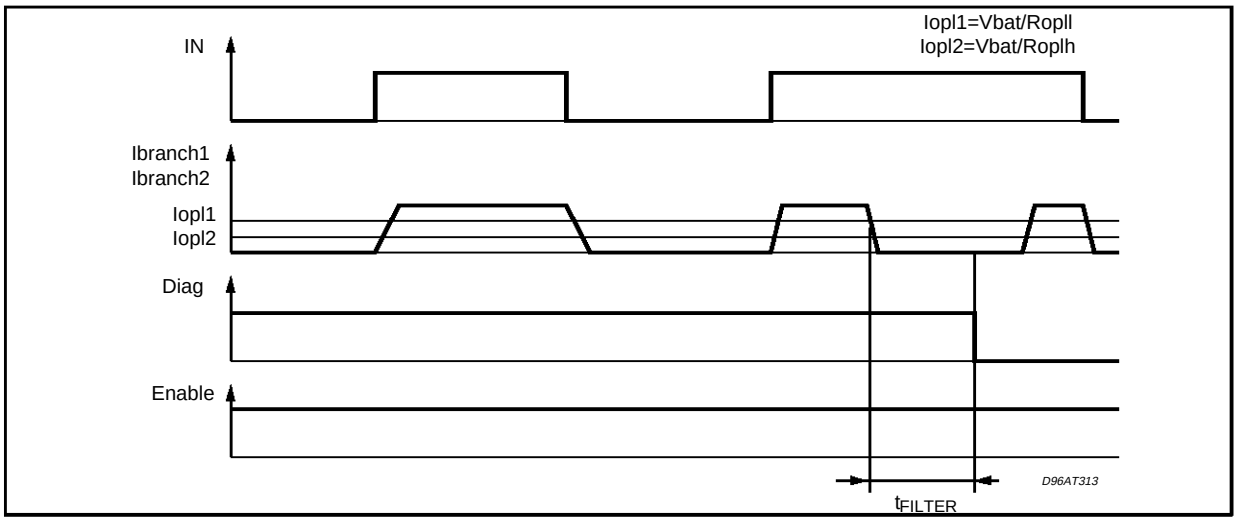


Figure 9: Open Load Condition 1: No Detection (NOT TESTED)

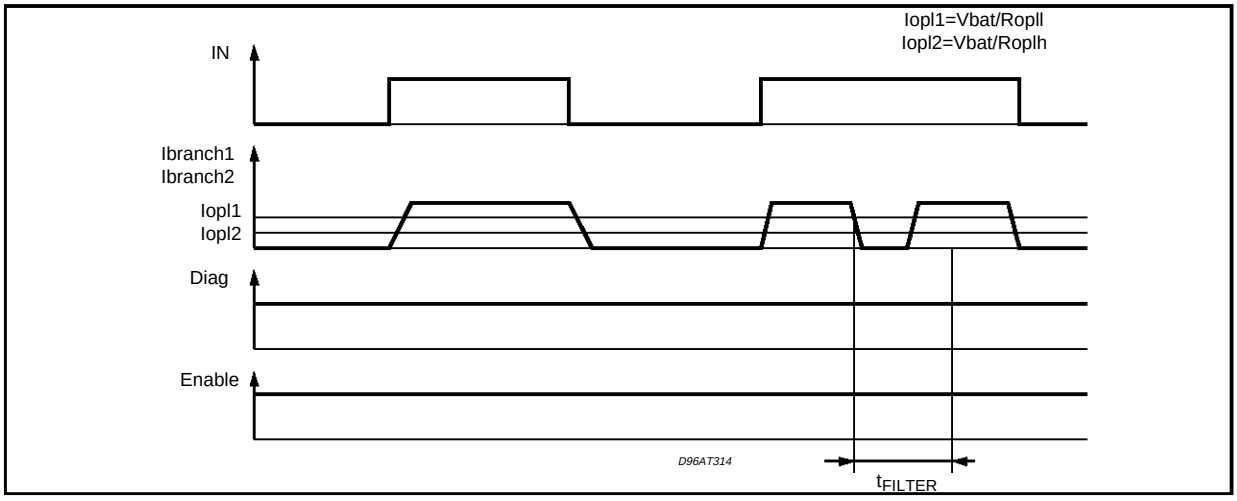


Figure 10: Open Load Condition 2: No Current after ($\overline{\text{ENABLE}}$)

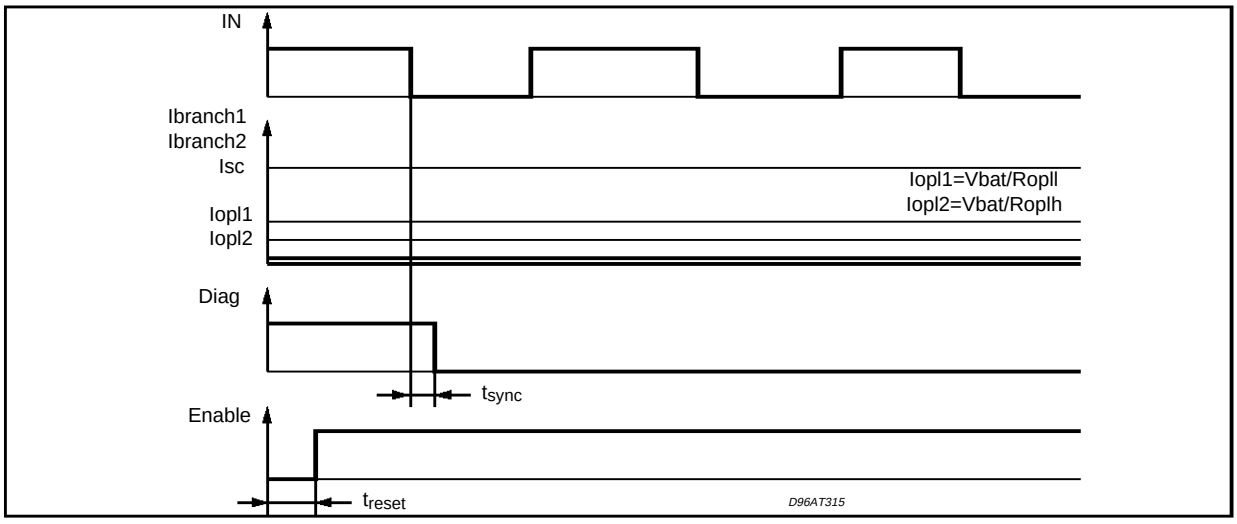


Figure 11: Open Load Condition 3

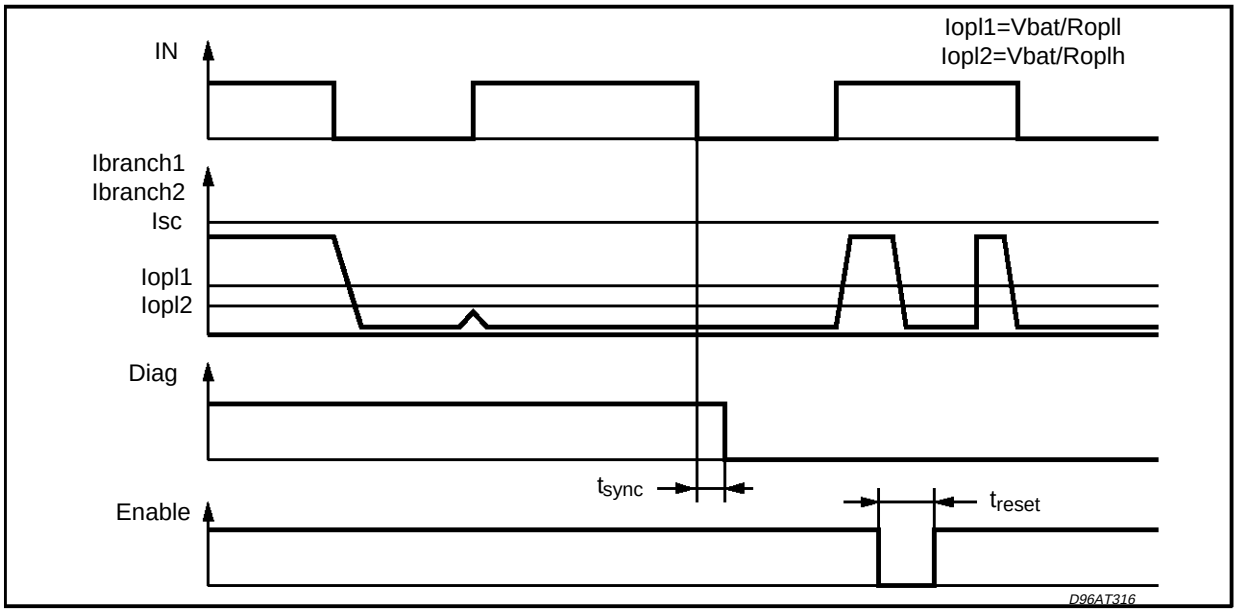


Figure 12: Open Load Condition 4: No Detection

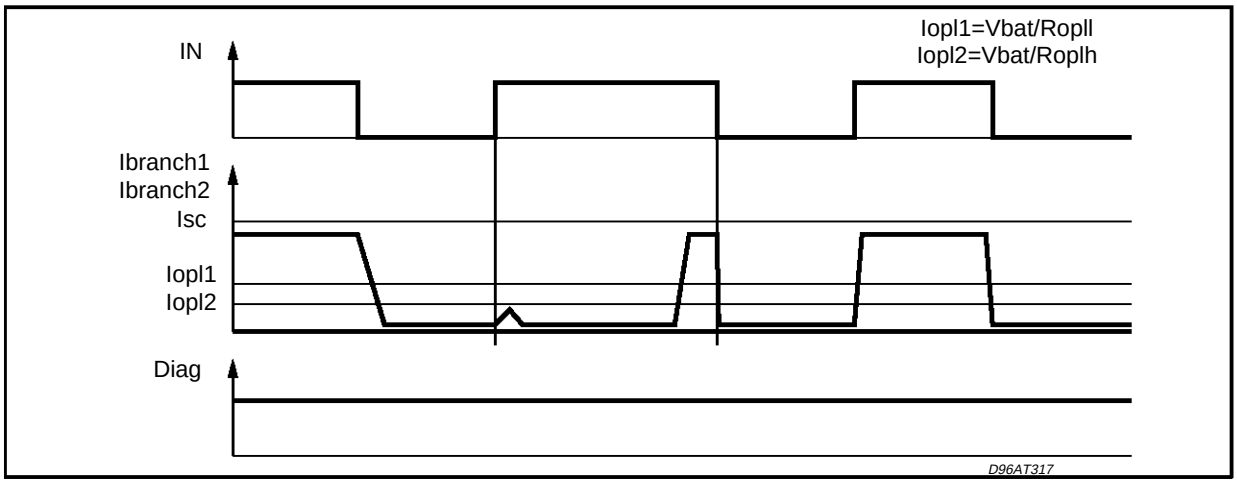
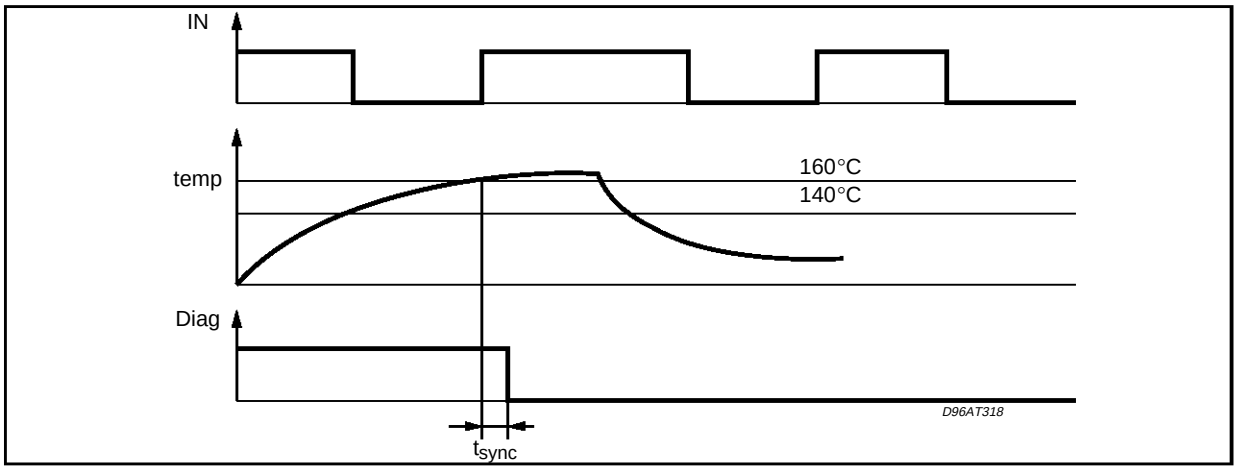
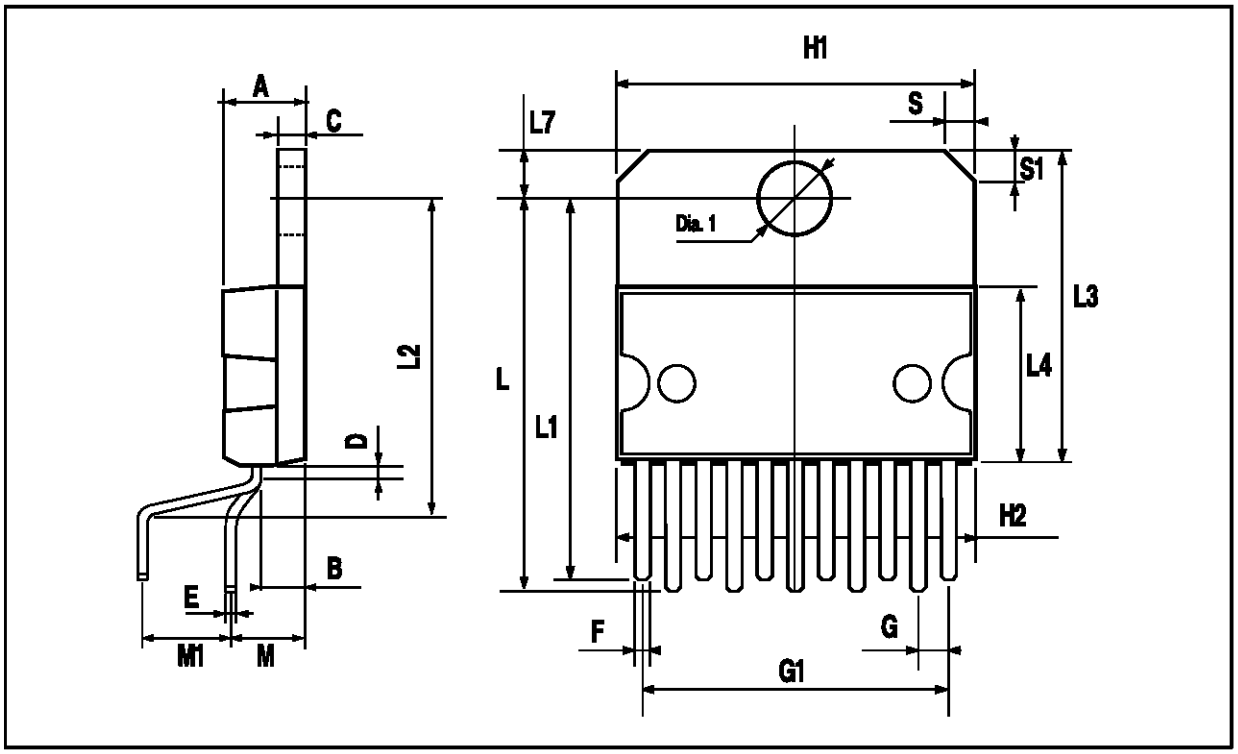


Figure 13: Overtemperature Detection



MULTIWATT11 PACKAGE MECHANICAL DATA

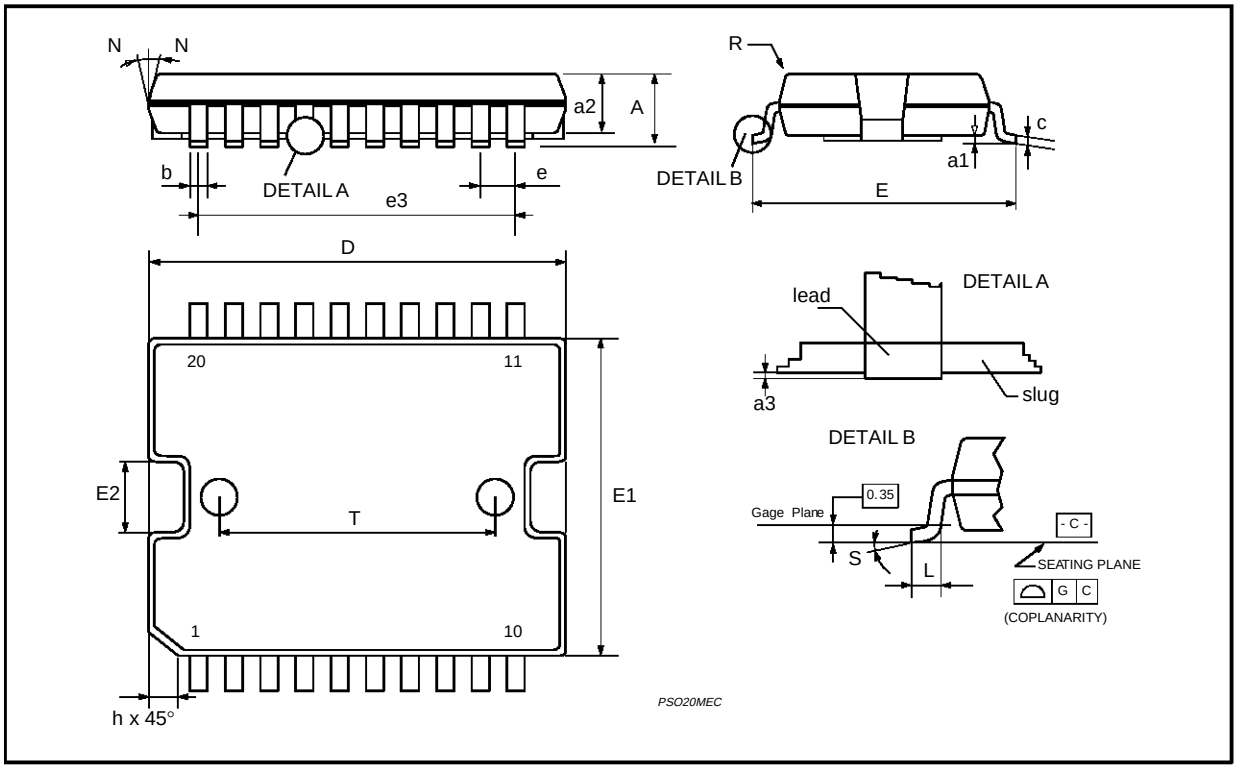
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			5			0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.88		0.95	0.035		0.037
G	1.45	1.7	1.95	0.057	0.067	0.077
G1	16.75	17	17.25	0.659	0.669	0.679
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.87	0.886
L2	17.4		18.1	0.685		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.73	5.08	5.43	0.186	0.200	0.214
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152



PowerSO20 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.60			0.1417
a1	0.10		0.30	0.0039		0.0118
a2			3.30			0.1299
a3	0		0.10	0		0.0039
b	0.40		0.53	0.0157		0.0209
c	0.23		0.32	0.009		0.0126
D (1)	15.80		16.00	0.6220		0.6299
E	13.90		14.50	0.5472		0.570
e		1.27			0.050	
e3		11.43			0.450	
E1 (1)	10.90		11.10	0.4291		0.437
E2			2.90			0.1141
G	0		0.10	0		0.0039
h			1.10			
L	0.80		1.10	0.0314		0.0433
N	10° (max.)					
S	8° (max.)					
T		10.0			0.3937	

(1) "D and E1" do not include mold flash or protrusions
- Mold flash or protrusions shall not exceed 0.15mm (0.006")



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