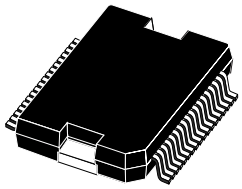
VN808

OCTAL CHANNEL HIGH SIDE DRIVER

TYPE	$R_{DS(on)}$	I_{OUT}	V_{CC}
VN808	150 mΩ	0.7 A	45V

- V_{CC}/2 COMPATIBLE INPUT
- JUNCTION OVERTEMPERATURE PROTECTION
- CASE OVERTEMPERATURE PROTECTION FOR THERMAL INDEPENDENCE OF THE CHANNELS
- CURRENT LIMITATION
- SHORTED LOAD PROTECTION
- UNDERVOLTAGE SHUTDOWN
- PROTECTION AGAINST LOSS OF GROUND
- VERY LOW STAND-BY CURRENT
- COMPLIANCE TO 61000-4-4 IEC TEST UP TO 4.4KV (see application schematic page 7)



PowerSO-36

ORDER CODES		
PACKAGE	**TUBE**	**T&R**
PowerSO-36	VN808	VN80813TR

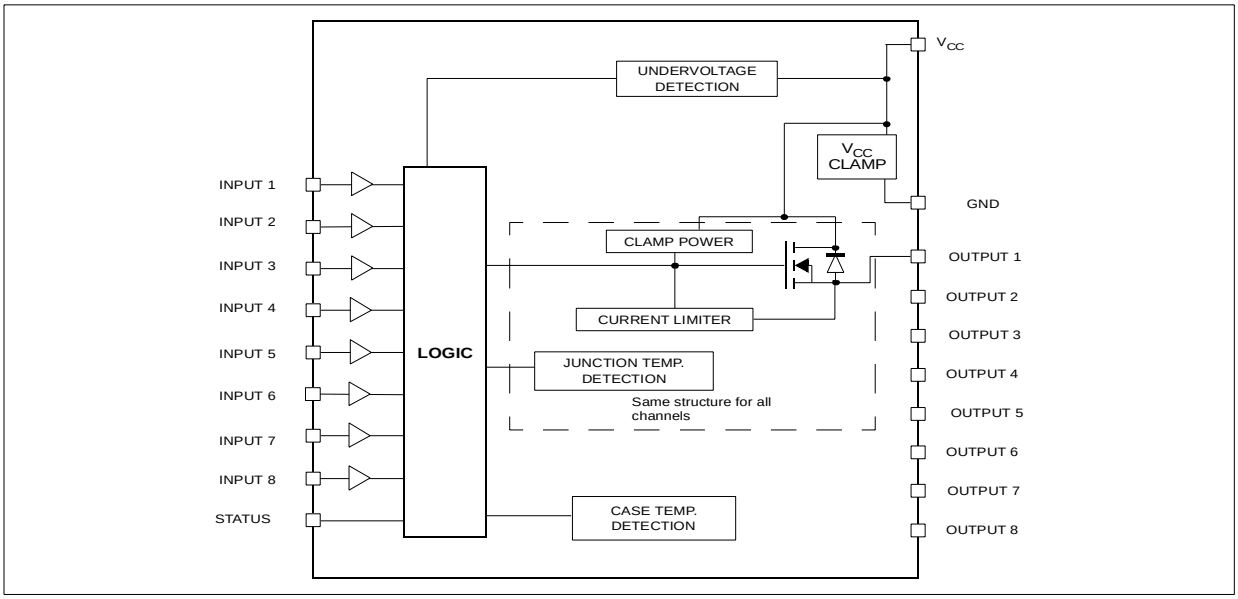
DESCRIPTION

The VN808 is a monolithic device designed in STMicroelectronics VIPower M0-3 Technology, intended for driving any kind of load with one side connected to ground.
Active current limitation combined with thermal shutdown and automatic restart, protect the device against overload.

In overload condition, channel turns off and back on automatically so as to maintain junction temperature between T_{TSD} and T_R. If this condition makes case temperature reach T_{CSD}, overloaded channel is turned off and will restart only when case temperature has decreased down to T_{CR} (see waveform 3 page 8). Non overloaded channels continue to operate normally.

Device automatically turns off in case of ground pin disconnection. This device is especially suitable for industrial applications conform to IEC 1131 (Programmable Controllers International Standard).

BLOCK DIAGRAM



Rev. 2

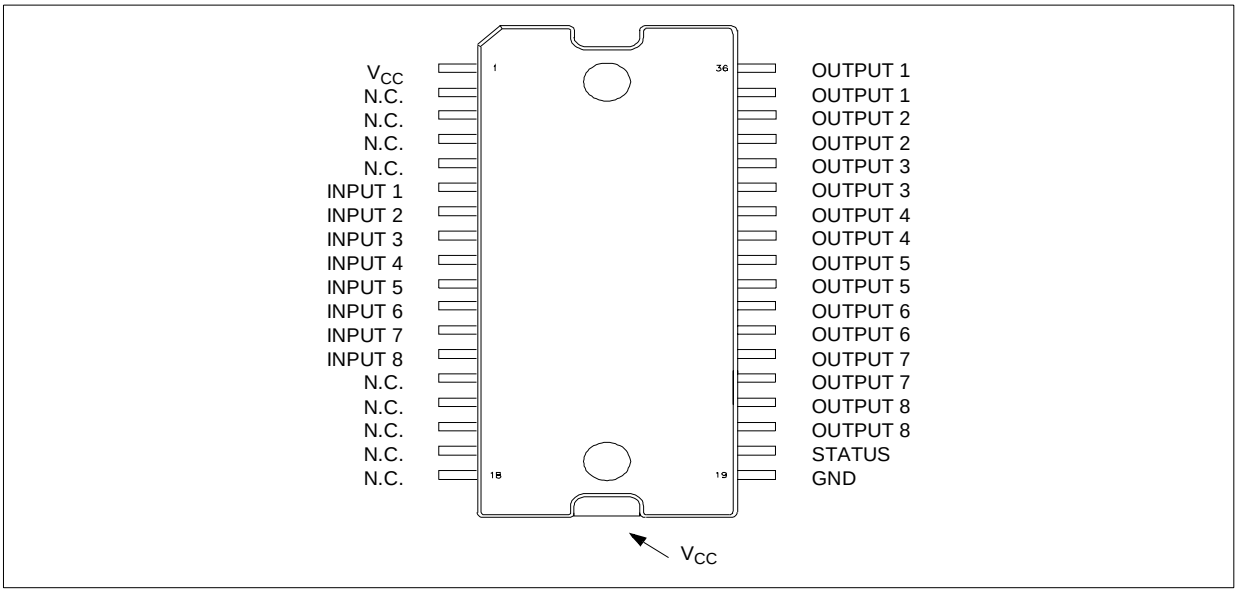
ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply voltage	45	V
- I_{GND}	DC Ground pin reverse current	- 250	mA
	TRAN Ground pin reverse current (pulse duration < 1ms)	-6	A
I_{OUT}	DC Output current	Internally Limited	A
- I_{OUT}	Reverse DC output current	- 2	A
I_{IN}	DC Input current	+/- 10	mA
V_{IN}	Input voltage range	$-3/+V_{CC}$	V
V_{ESD}	Electrostatic discharge (R=1.5KΩ; C=100pF)	2000	V
P_{tot}	Power dissipation T_C=25°C	96	W
L_{max}	Max inductive load (V_{CC}=24V, R_{LOAD}=48Ω, T_{amb}=100^{0}C)	2	H
T_j	Junction operating temperature	Internally Limited	°C
T_c	Case operating temperature	Internally Limited	°C
T_{stg}	Storage temperature	- 55 to 150	°C

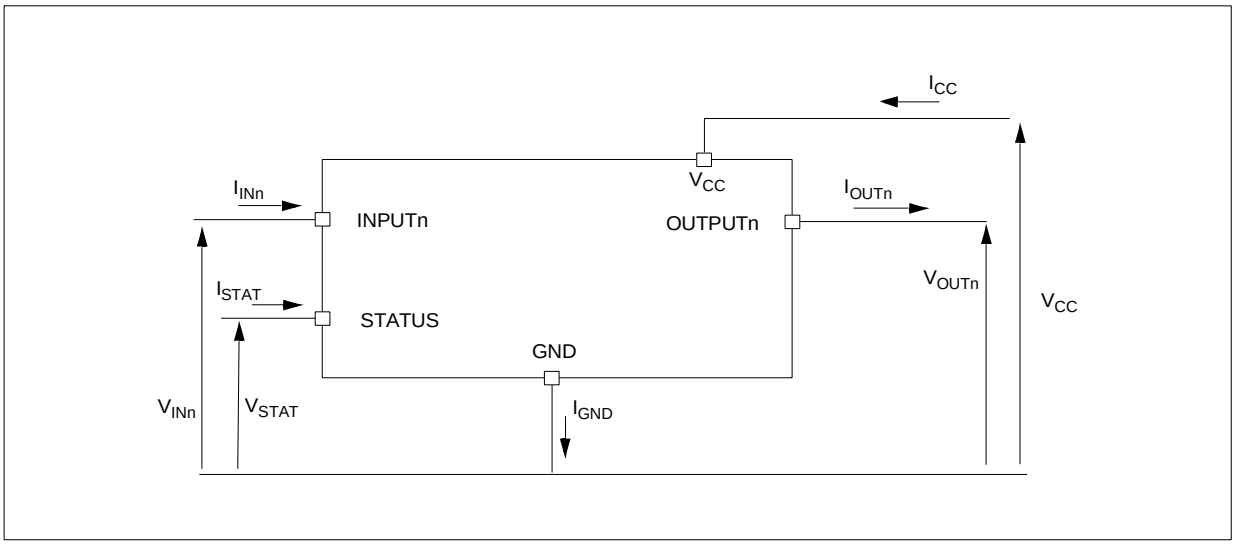
PIN DEFINITIONS AND FUNCTIONS

Pin No	Symbol	Function
TAB	V_{CC}	Positive power supply voltage
1	V_{CC}	Positive power supply voltage
2,3,4,5	NC	Not connected
6	INPUT 1	Input of channel 1
7	INPUT 2	Input of channel 2
8	INPUT 3	Input of channel 3
9	INPUT 4	Input of channel 4
10	INPUT 5	Input of channel 5
11	INPUT 6	Input of channel 6
12	INPUT 7	Input of channel 7
13	INPUT 8	Input of channel 8
14,15,16,17,18	NC	Not connected
19	GND	Logic ground
20	STATUS	Common open source diagnostic for overtemperature
21,22	OUTPUT 8	High-Side output of channel 8
23,24	OUTPUT 7	High-Side output of channel 7
25,26	OUTPUT 6	High-Side output of channel 6
27,28	OUTPUT 5	High-Side output of channel 5
29,30	OUTPUT 4	High-Side output of channel 4
31,32	OUTPUT 3	High-Side output of channel 3
33,34	OUTPUT 2	High-Side output of channel 2
35,36	OUTPUT 1	High-Side output of channel 1

CONNECTION DIAGRAM (TOP VIEW)



CURRENT AND VOLTAGE CONVENTIONS



THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	Max	1.3	°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient (*)	Max	50	°C/W

(*) When mounted on FR4 printed circuit board with 0.5 cm^2 of copper area (at least 35µ thick) connected to all TAB pins.

ELECTRICAL CHARACTERISTICS (10.5V<V_{CC}<32V; -40°C<T_j<125°C, unless otherwise specified)

POWER

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{CC}	Operating supply voltage		10.5		45	V
V_{USD}	Undervoltage shut-down		7		10.5	V
R_{ON}	On state resistance	I_{OUT} =0.5A; T_j=25°C I_{OUT}=0.5A		150	185 280	mΩ mΩ
I_S	Supply current	Off state; V_{CC}=24V; T_{case}=25°C On state (all channels ON); V_{CC}=24V; T_{case}=100°C			150 12	µA mA
I_{LGND}	Output current at turn-off	V_{CC}=V_{STAT}=V_{IN}=V_{GND}=24V V_{OUT}=0V			1	mA
$I_{L(off)}$	Off state output current	V_{IN}=V_{OUT}=0V	0		5	µA
V_{OUToff}	Off state output voltage	V_{IN}=0V, I_{OUT}=0A			3	V
$t_{d(Vccon)}$	Power-on delay time from V_{CC} rising edge	(see Fig.1b: switching time waveforms)		1		ms

SWITCHING (V_{CC}=24V)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
t_{on}	Turn-on time	R_L=48Ω from 80% V_{OUT} (**)		50	100	µs
t_{off}	Turn-off time	R_L=48Ω to 10% V_{OUT} (**)		75	150	µs
$dV_{OUT}/dt_{(on)}$	Turn-on voltage slope	R_L=48Ω from V_{OUT}=2.4V to V_{OUT}=19.2V (**)		0.7		V/µs
$dV_{OUT}/dt_{(off)}$	Turn-off voltage slope	R_L=48Ω from V_{OUT}=21.6V to V_{OUT}=2.4V (**)		1.5		V/µs

(**) see figure 1a: switching time waveforms

INPUT PIN

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{INL}	Input low level				$V_{CC/2}$ -1	V
I_{INL}	Low level input current	V_{IN}=$V_{CC/2}$ -1V	80			µA
V_{INH}	Input high level		$V_{CC/2}$+1			V
I_{INH}	High level input current	V_{IN}=$V_{CC/2}$+1V		150	260	µA
$V_{I(hyst)}$	Input hysteresis voltage			0.6		V
I_{IN}	Input current	V_{IN}=V_{CC}=32V			300	µA

ELECTRICAL CHARACTERISTICS (continued)

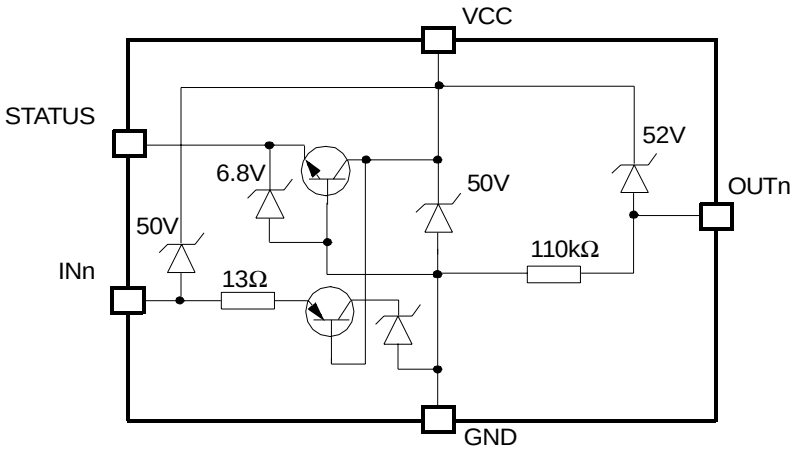
PROTECTIONS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
T_{CSD}	Case shut-down temperature		125	130	135	°C
T_{CR}	Case reset temperature		110			°C
T_{CHYST}	Case thermal hysteresis		7	15		°C
T_{TSD}	Junction shut-down temperature		150	175	200	°C
T_R	Junction Reset temperature		135			°C
T_{HYST}	Junction thermal hysteresis		7	15		°C
I_{lim}	DC Short circuit current	V_{CC}=24V; R_{LOAD}=10mΩ	0.7		1.7	A
V_{demag}	Turn-off output clamp voltage	I_{OUT}=0.5 A; L=6mH	V_{CC}-47	V_{CC}-52	V_{CC}-57	V

STATUS PIN

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_{HSTAT}	High level output current	Vcc=18...32V,R_{STAT}=1kΩ (Fault condition)	2	3	4	mA
I_{LSTAT}	Leakage current	Normal operation; V_{CC}=32V			0.1	µA
V_{CLSTAT}	Clamp voltage	I_{STAT}=1mA I_{STAT}= -1mA	6.0	6.8 -0.7	8.0	V V

EQUIVALENT INTERNAL BLOCK DIAGRAM (same structure for all channels)



APPLICATION EXAMPLE

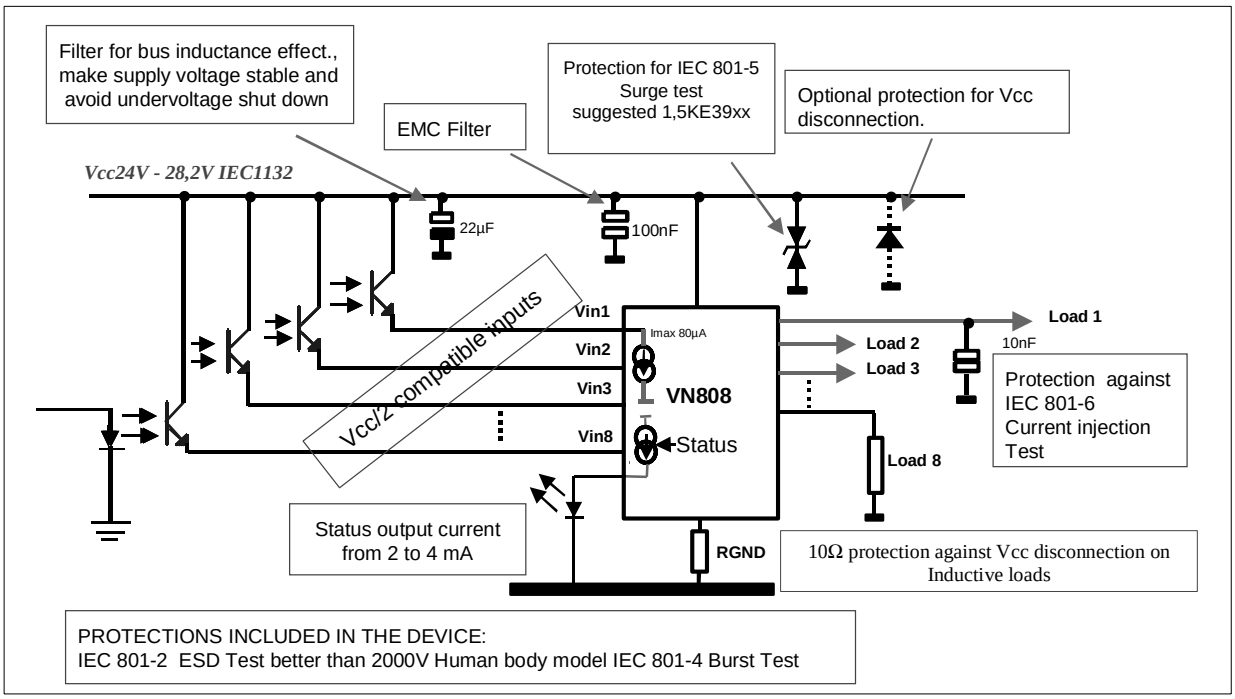


Figure 1: Switching Time Waveforms

Fig. 1a: Turn-on & Turn-off

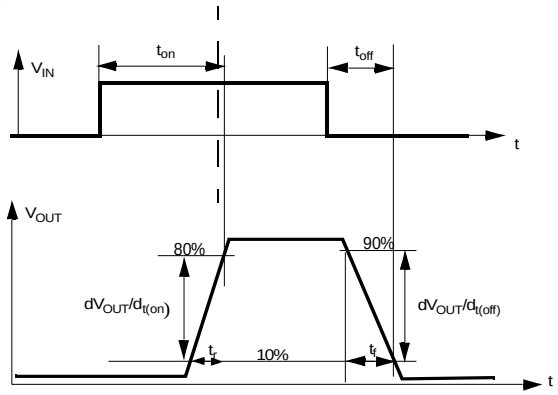
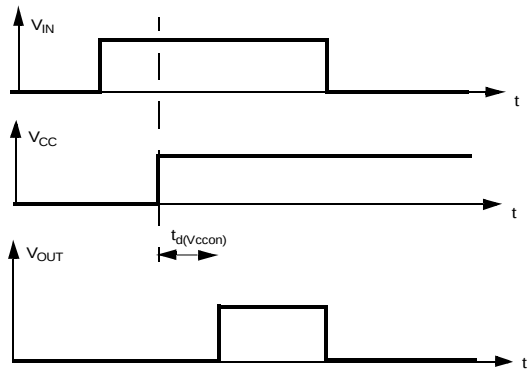


Fig. 1b: V_{CC} turn-on



TRUTH TABLE

CONDITIONS	INPUTn	OUTPUTn	STATUS
Normal operation	L H	L H	L L
Current limitation	L H	L X	L L
Overtemperature (see waveforms 3,4 page 9,10) --> $T_j > T_{TSD}$	L H	L L	L H
Undervoltage	L H	L L	X X

APPLICATION SCHEMATIC

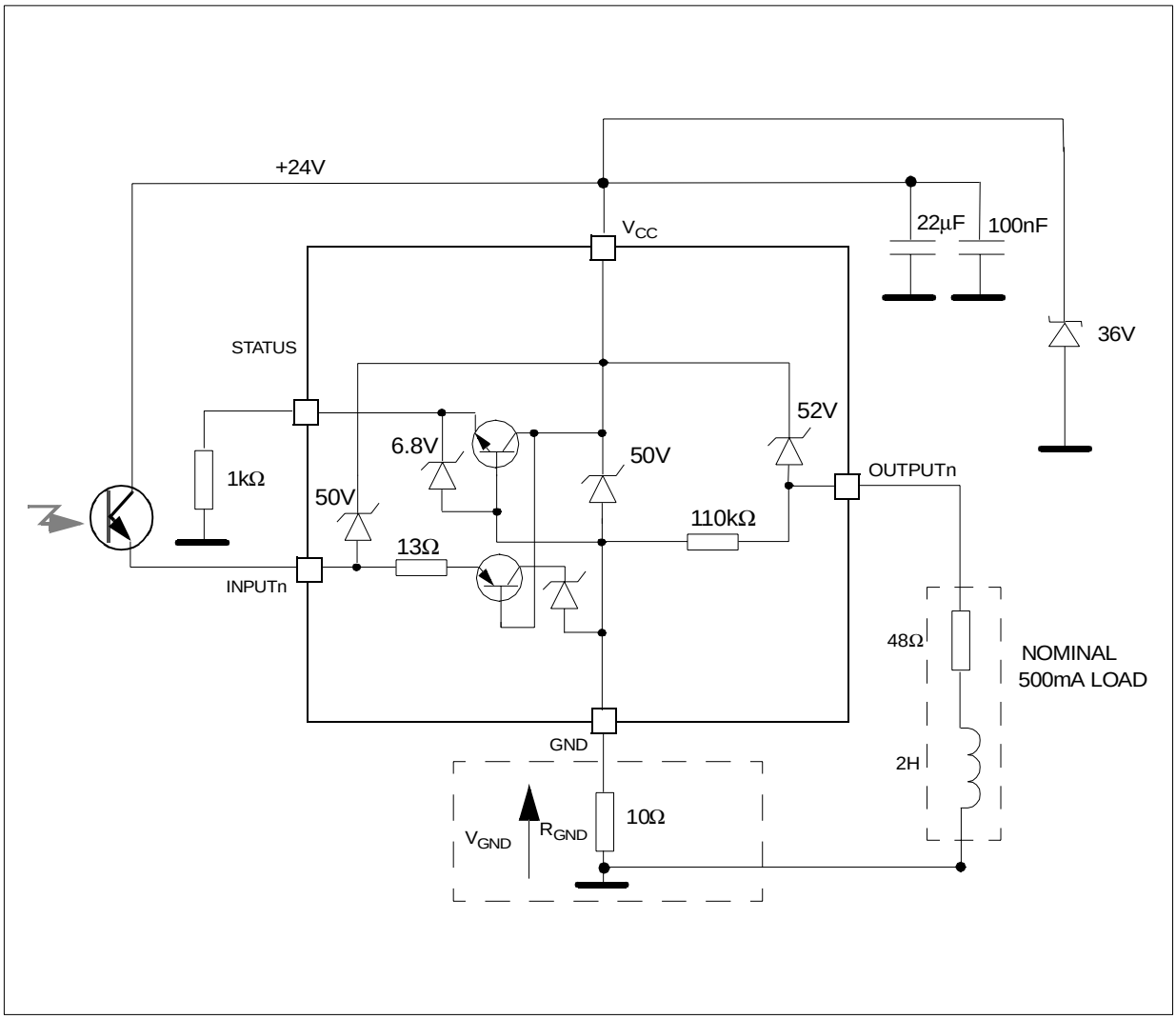
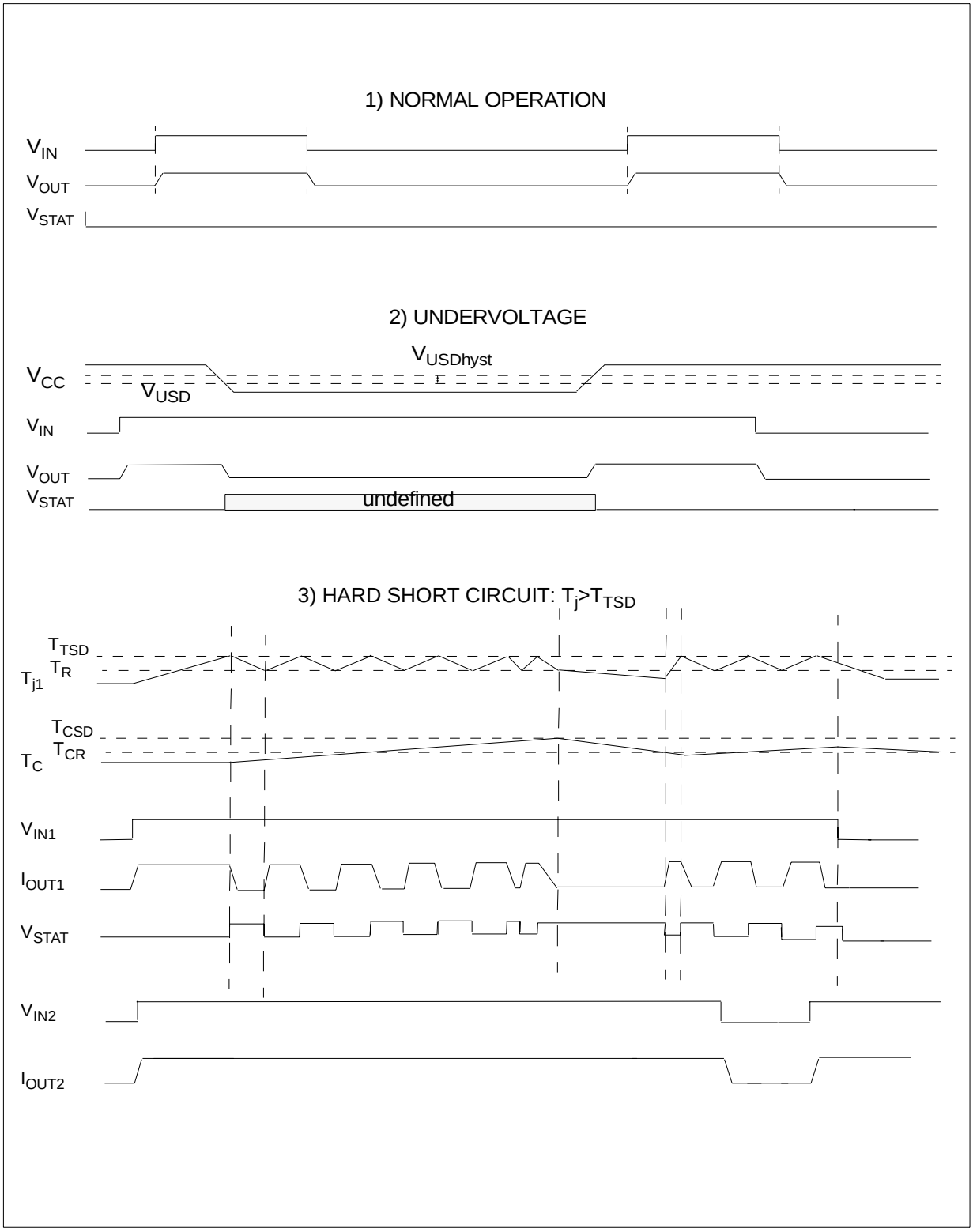
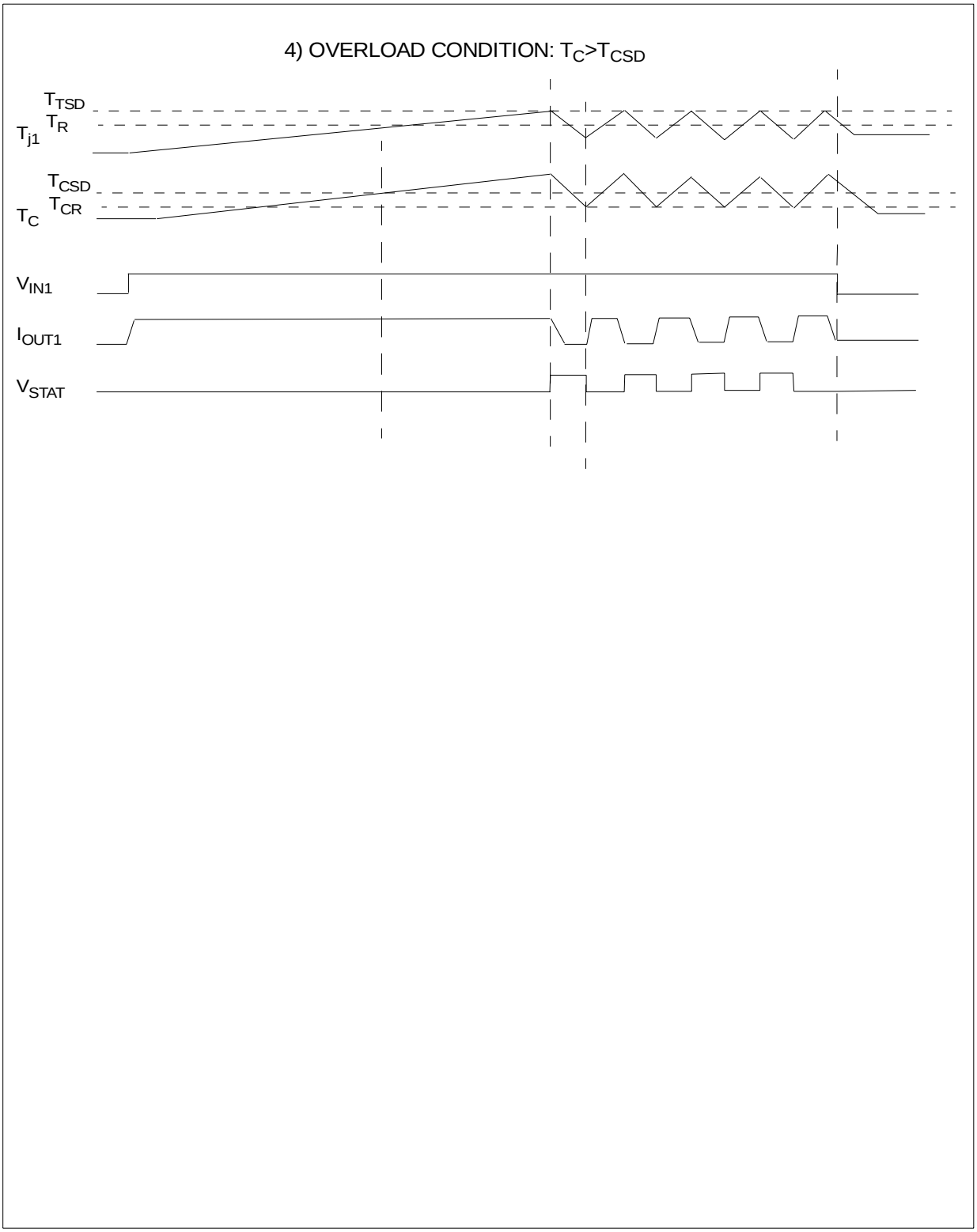


Figure 2: Waveforms



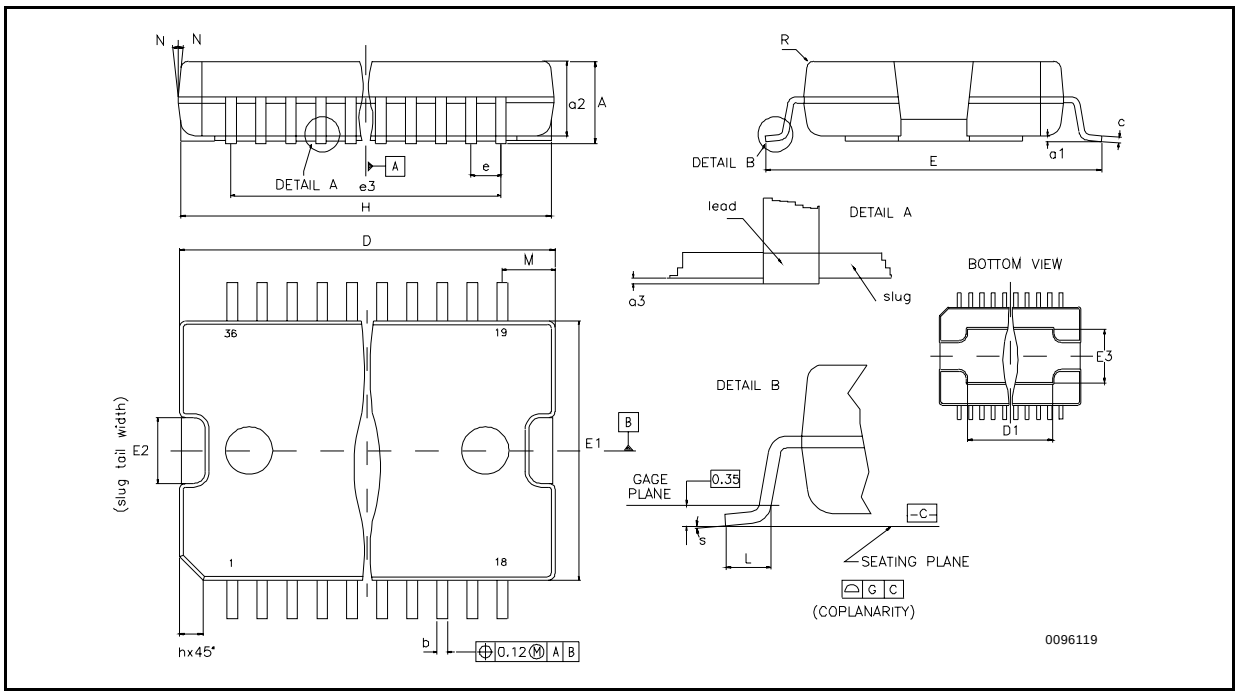
Waveforms (continued)



PowerSO-36 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			3.60			0.141
a1	0.10		0.30	0.004		0.012
a2			3.30			0.130
a3	0		0.10	0		0.004
b	0.22		0.38	0.008		0.015
c	0.23		0.32	0.009		0.012
D (1)	15.80		16.00	0.622		0.630
D1	9.40		9.80	0.370		0.385
E	13.90		14.50	0.547		0.570
E1 (1)	10.90		11.10	0.429		0.437
E2			2.90			0.114
E3	5.80		6.20	0.228		0.244
e		0.65			0.0256	
e3		11.05			0.435	
G	0		0.10	0		0.004
H	15.50		15.90	0.610		0.626
h			1.10			0.043
L	0.80		1.10	0.031		0.043
N	10° (max)					
S	8° (max)					

(1): “D” and “E1” do not include mold flash or protrusions
- Mold flash or protrusions shall not exceed 0.15mm (0.006 inch)
- Critical dimensions are “a3”, “E” and “G”.



REVISION HISTORY

Date	Revision	Description of Changes
Sep. 2003	1	- First issue
Jul. 2004	2	- ORDER CODE table insertion (page 1) - EQUIVALENT INTERNAL BLOCK DIAGRAM of the APPLICATION SCHEMATIC correction (page 7) - Revision history table insertion (page 11)