

OCTAL CHANNEL HIGH SIDE DRIVER

PRELIMINARY DATA

TYPE	$R_{DS(on)}$	I_{OUT}	V_{CC}
VN808	160 m Ω	0.7 A	45V

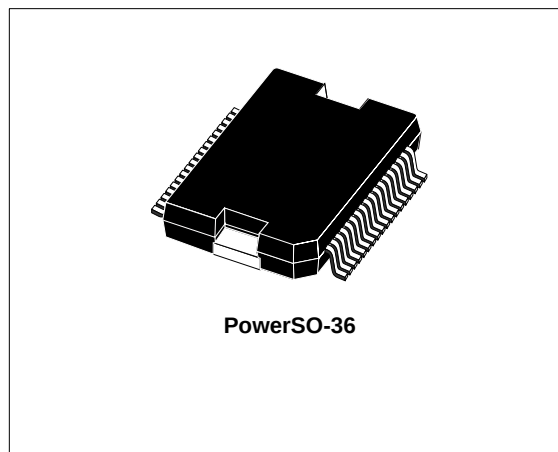
- $V_{CC}/2$ COMPATIBLE INPUT
- JUNCTION OVERTEMPERATURE PROTECTION
- CASE OVERTEMPERATURE PROTECTION FOR THERMAL INDEPENDENCE OF THE CHANNELS
- CURRENT LIMITATION
- SHORTED LOAD PROTECTION
- UNDERVOLTAGE SHUTDOWN
- PROTECTION AGAINST LOSS OF GROUND
- VERY LOW STAND-BY CURRENT
- COMPLIANCE TO 61000-4-4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

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.

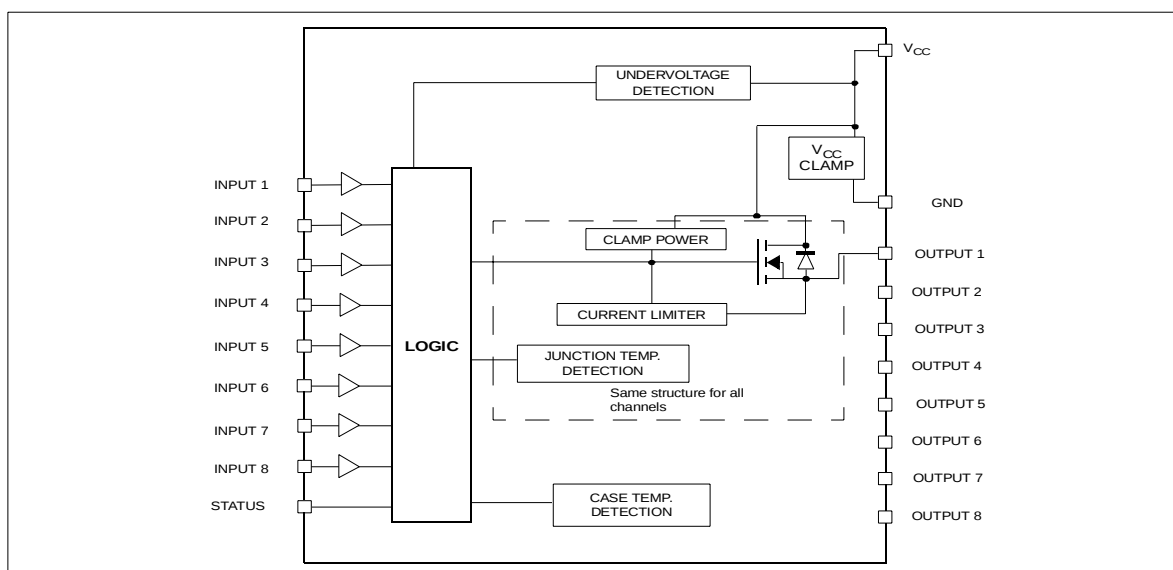
In overload condition, channel turns off and back on automatically so as to maintain junction



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



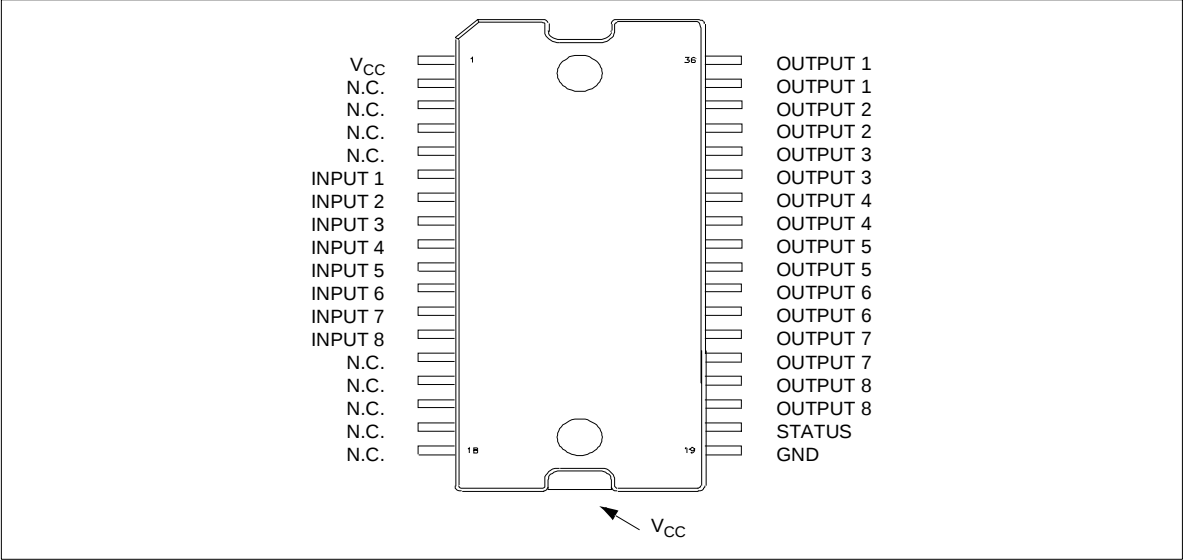
ABSOLUTE MAXIMUM RATING

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=1.5K Ω ; C=100pF)	2000	V
P_{tot}	Power dissipation $T_C=25^{\circ}C$	96	W
L_{max}	Max inductive load ($V_{CC}=24V$, $R_{LOAD}=48\Omega$, $T_{amb}=100^{\circ}C$)	2	H
T_j	Junction operating temperature	Internally Limited	$^{\circ}C$
T_c	Case operating temperature	Internally Limited	$^{\circ}C$
T_{stg}	Storage temperature	- 55 to 150	$^{\circ}C$

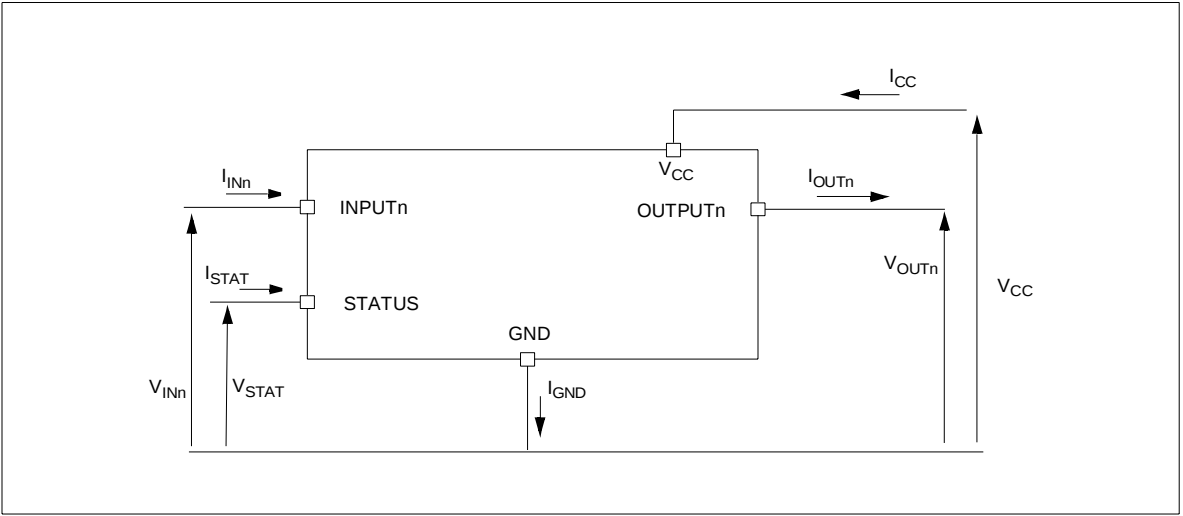
PIN DEFINITIONS AND FUNCTIONS

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
$R_{thj-case}$	Thermal resistance junction-case	Max	1.3
$R_{thj-amb}$	Thermal resistance junction-ambient (*)	Max	50

(*) When mounted on FR4 printed circuit board with 0.5 cm² 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			160 280	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 _{OUT(off)}	Off state output voltage	V _{IN} = 0V, I _{OUT} = 0A			3	V
t _{d(Vcon)}	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	$V_{CC}=24V$; $R_{LOAD}=10m\Omega$	0.7		1.7	A
V_{demag}	Turn-off output clamp voltage	$I_{OUT}=0.5\text{ A}$; $L=6mH$	$V_{CC}-47$	$V_{CC}-52$	$V_{CC}-57$	V

STATUS PIN

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_{HSTAT}	High level output current	$V_{CC}=18...32V$, $R_{STAT}=1k\Omega$ (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

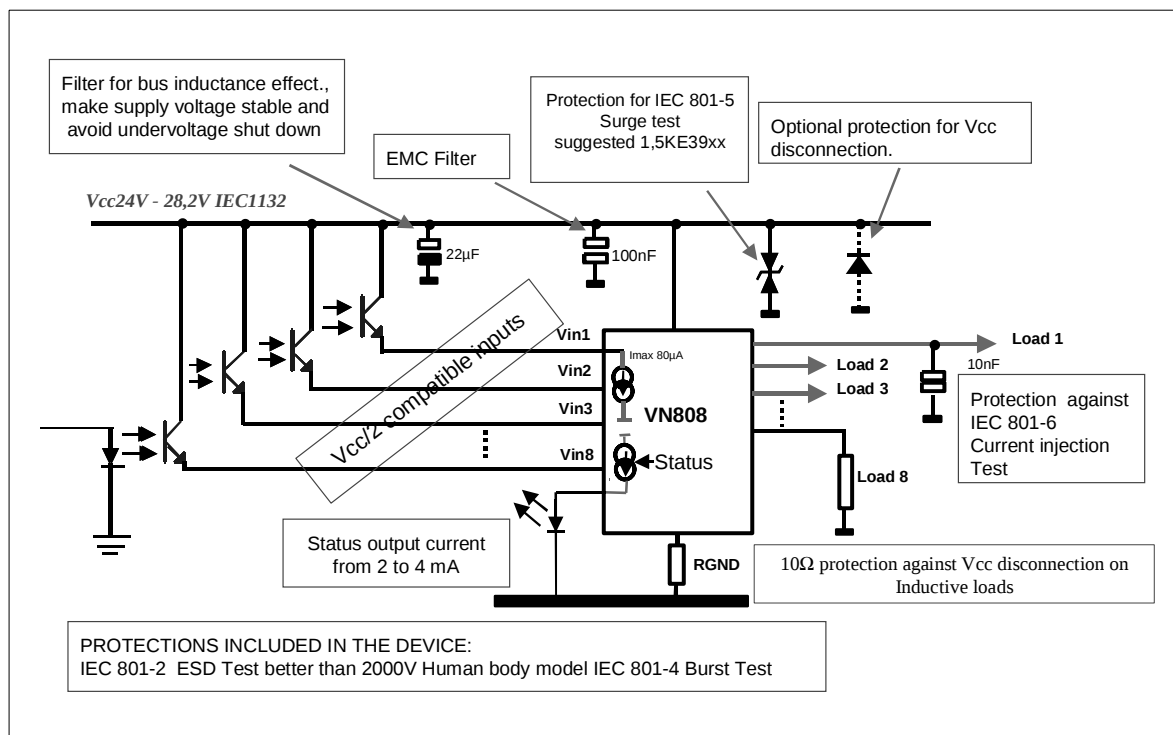
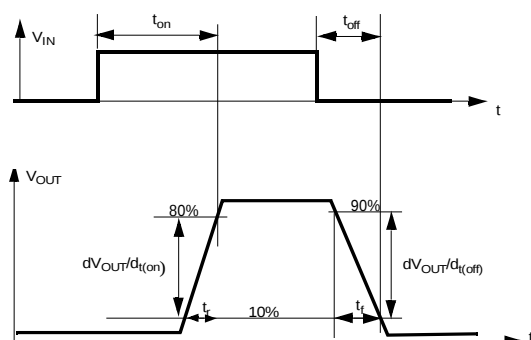
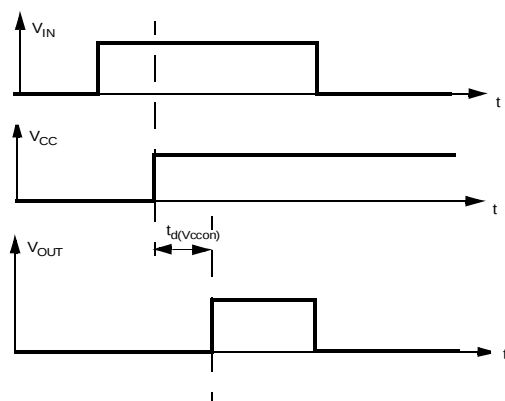
APPLICATION EXAMPLE

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

APPLICATION SCHEMATIC

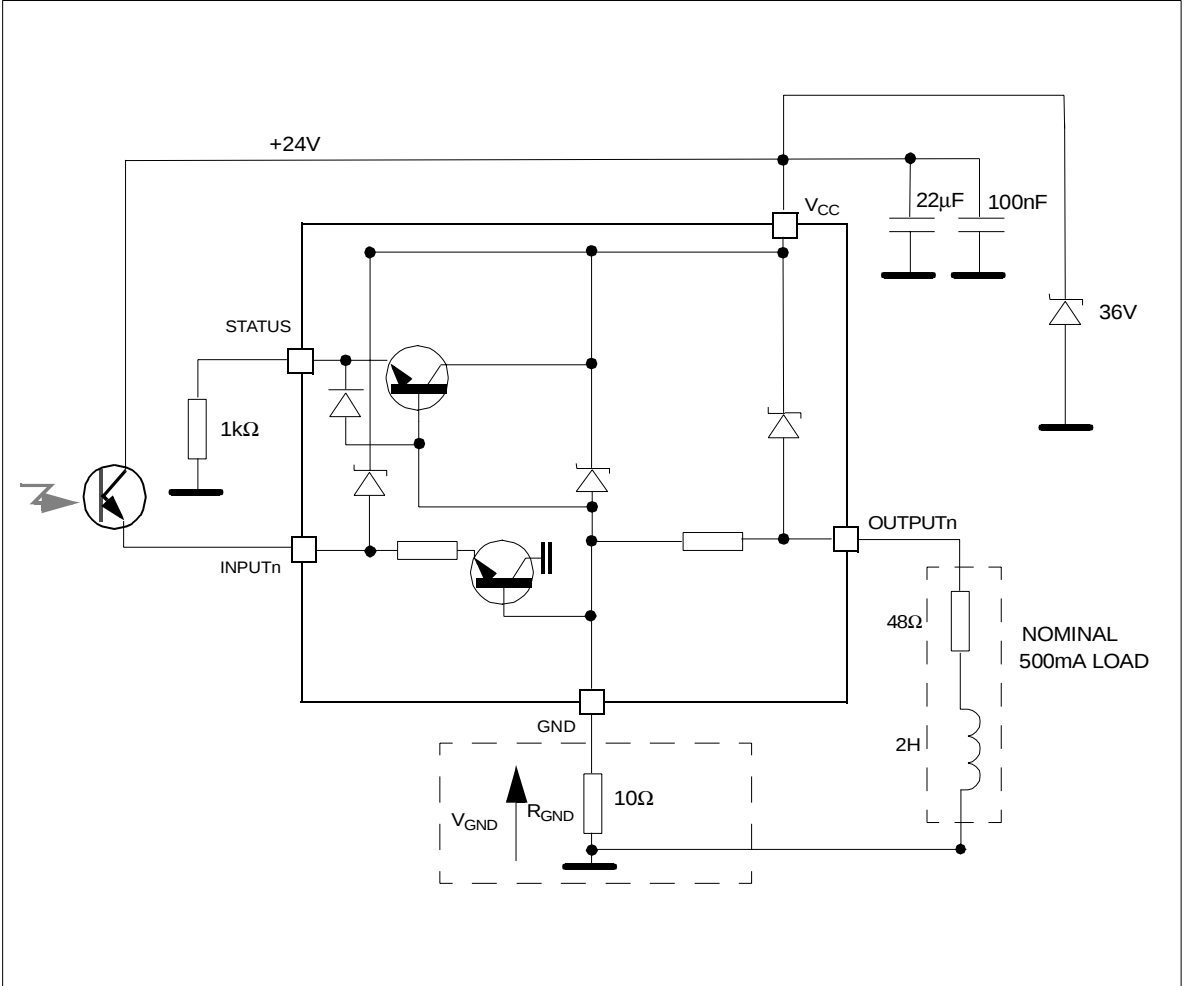
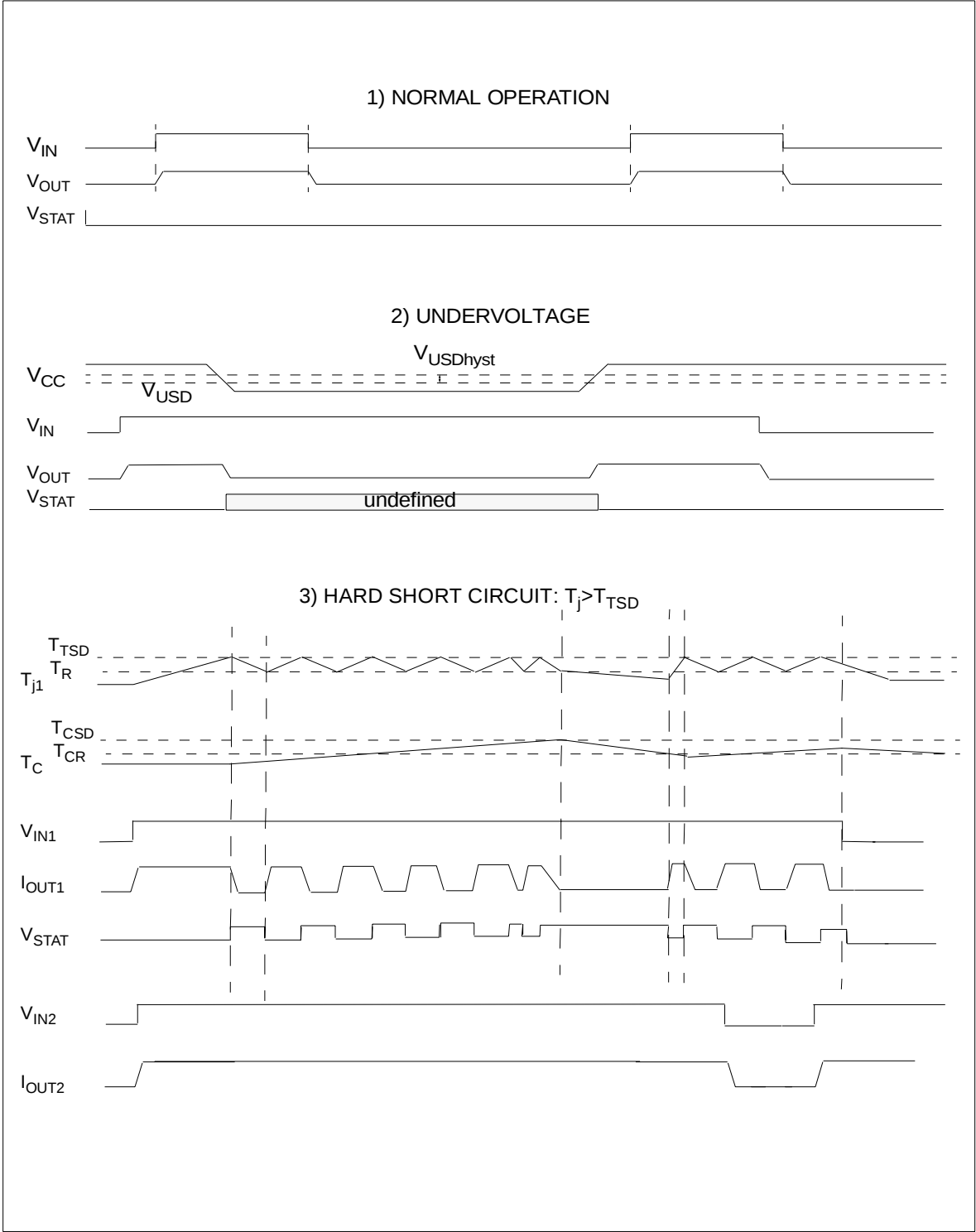
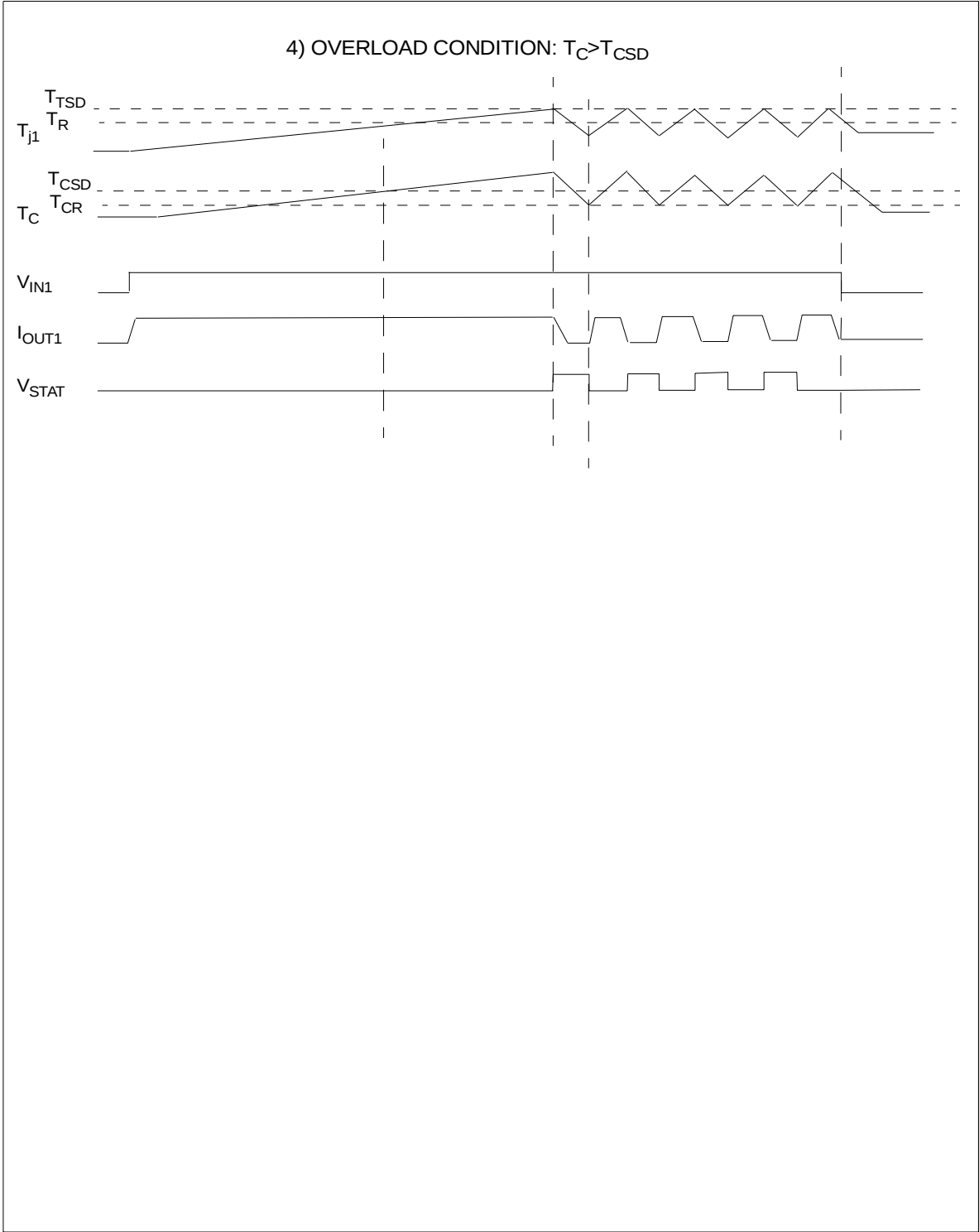


Figure 2: Waveforms



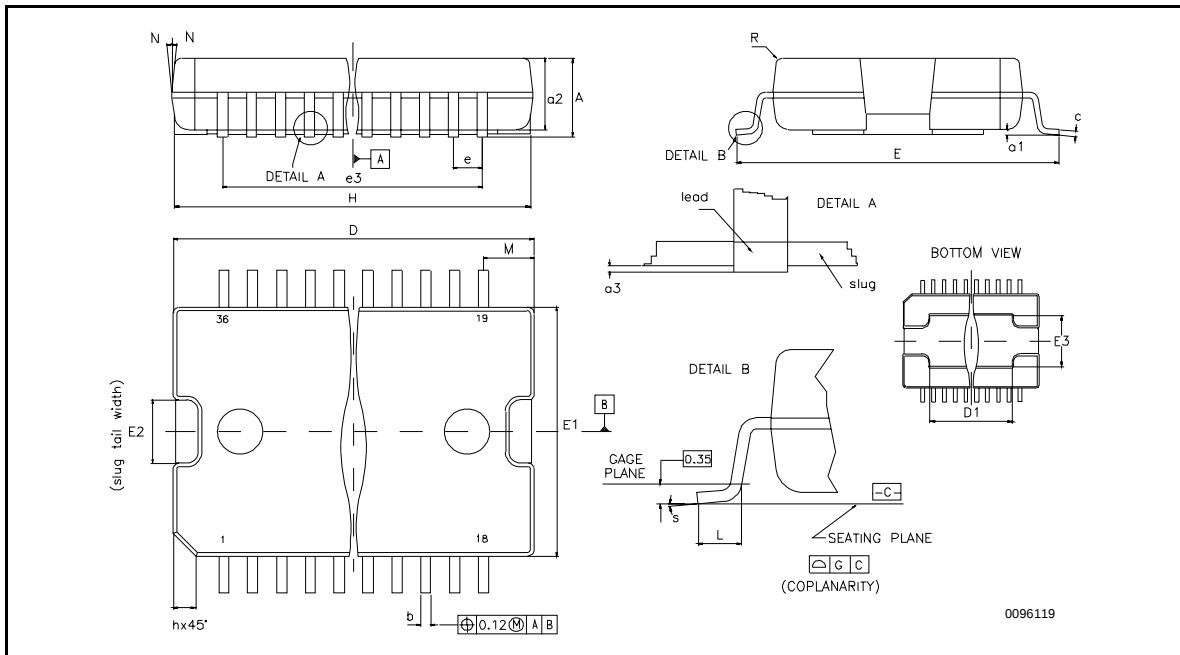
Waveforms (continued)



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".



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