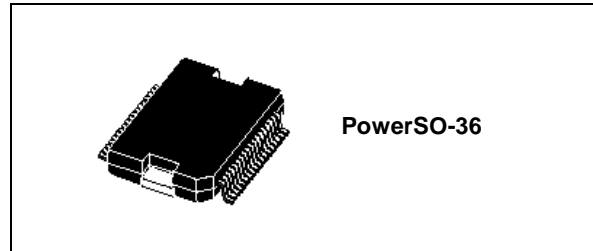


OCTAL CHANNEL HIGH SIDE DRIVER

General Features

Type	$R_{DS(on)}$	I_{out}	V_{CC}
VN808	150m Ω	0.7A	45V

- $V_{CC}/2$ COMPATIBLE INPUT
- JUNCTION OVER-TEMPERATURE PROTECTION
- CASE OVER-TEMPERATURE 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 4KV



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 [Figure 7 on page 9](#)). 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 61131

Description

The VN808 is a monolithic device designed in STMicroelectronics VIPower M0-3 technology,

Block Diagram

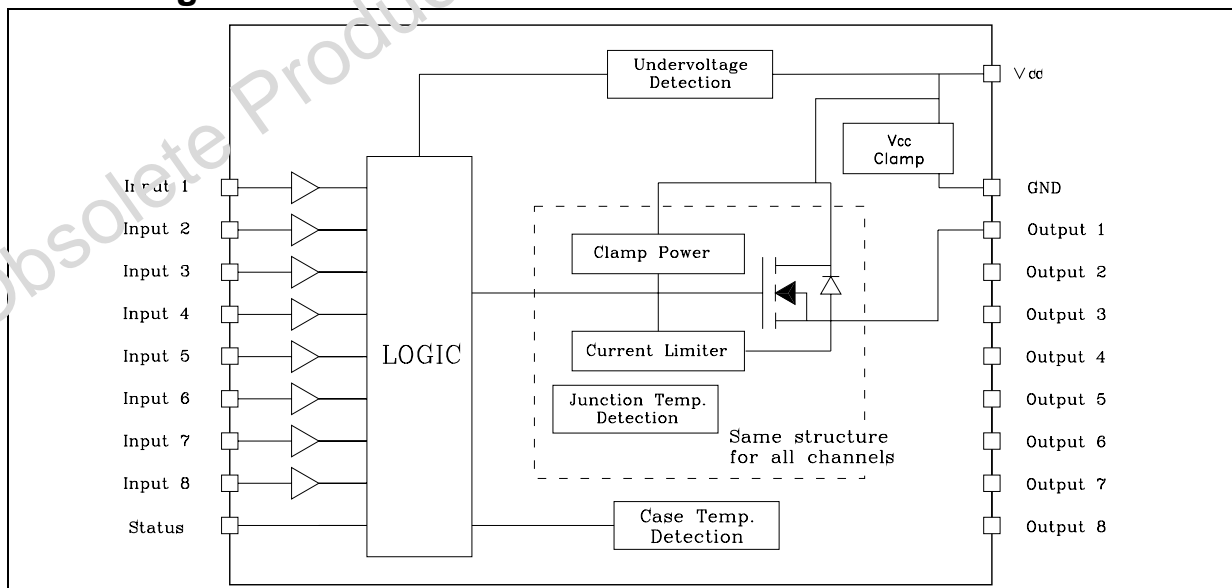


Table 1. Absolute Maximum Rating

Symbol	Parameter	Value	Unit
V_{CC}	DC Supply voltage	45	V
$-I_{GND}$	DC ground pin reverse current TRAN Ground pin reverse current (pulse duration < 1ms)	-250 -6	mA 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 = 1.5KW; C = 100pF)	2000	V
P_{TOT}	Power dissipation at $T_c = 25^\circ\text{C}$	96	W
L_{MAX}	Max inductive load ($V_{CC} = 24\text{V}$, $R_{LOAD} = 48\Omega$, $T_A = 100^\circ\text{C}$)	2	H
T_J	Junction operating temperature	Internally limited	$^\circ\text{C}$
T_C	Case operating temperature	Internally limited	$^\circ\text{C}$
T_{STG}	Storage Temperature	-55 to 150	$^\circ\text{C}$

Table 2. 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 over-temperature
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

Figure 1. Connection Diagram (Top View)

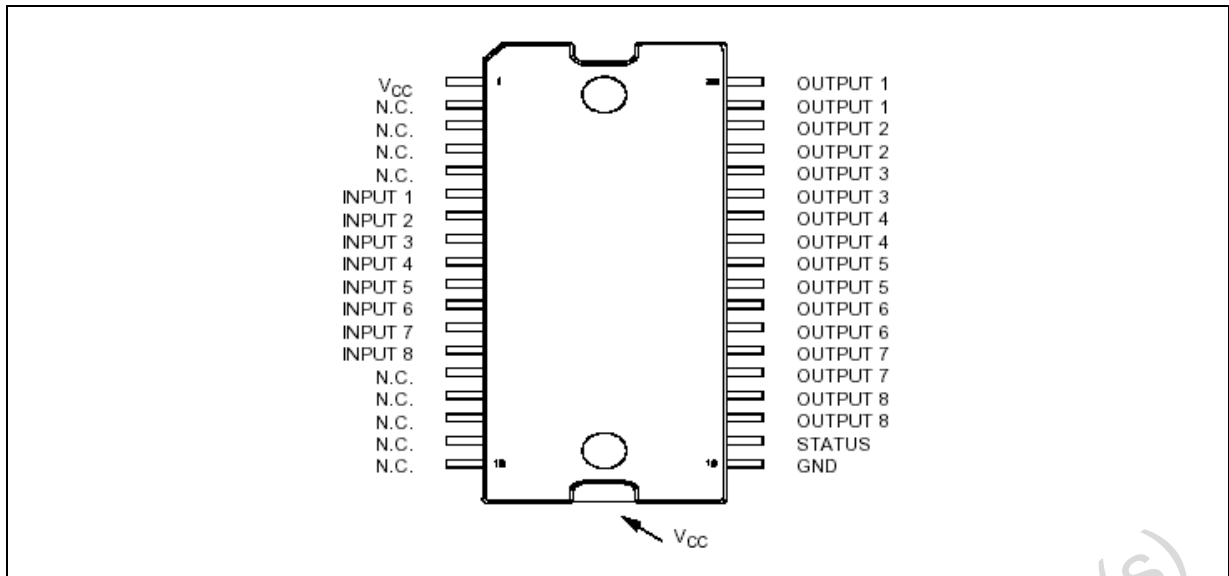
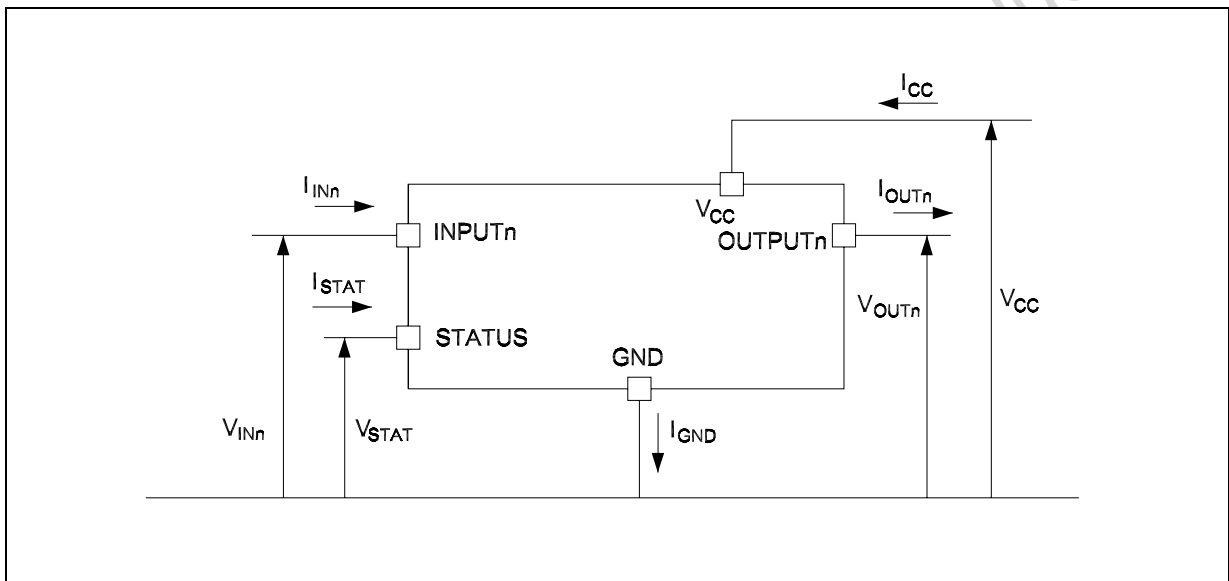


Figure 2. Current and Voltage Conventions



Obsolete

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case	Max	1.3 °C/W
R_{thJA}	Thermal resistance junction-ambient <i>Note:1</i>	Max	50 °C/W

Note: 1. When mounted on FR4 printed circuit board with 0.5cm^2 of copper area (at least 35μ thick) connected to all TAB pins.

Electrical Characteristics ($10.5\text{V} < V_{CC} < 32\text{V}$; $-40^\circ\text{C} < T_J < 100^\circ\text{C}$; unless otherwise specified)

Table 4. Power Section

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Operating supply voltage		10.5		45	V
V_{USD}	Undervoltage shutdown		7		10.5	V
R_{ON}	On state resistance	$I_{OUT} = 0.5\text{A}$; $T_J = 25^\circ\text{C}$ $I_{OUT} = 0.5\text{A}$;		150	185 280	$\text{m}\Omega$ $\text{m}\Omega$
I_S	Supply current	OFF state; $V_{CC} = 24\text{V}$; $T_{CASE} = 25^\circ\text{C}$ ON state(all channels ON); $V_{CC} = 24\text{V}$ $T_{CASE} = 100^\circ\text{C}$			150 12	μA mA
I_{LGND}	Output current at turn-off	$V_{CC} = V_{STAT} = V_{IN} = V_{GND} = 24\text{V}$ $V_{OUT} = 0\text{V}$			1	mA
$I_{L(off)}$	OFF state output current	$V_{IN} = V_{OUT} = 0\text{V}$;	0		5	μA
$V_{OUT(off)}$	OFF state output voltage	$V_{IN} = 0\text{V}$, $I_{OUT} = 0\text{A}$			3	V
$t_d(V_{CCon})$	Power-on delay time from V_{CC} rising edge	<i>Figure 6.</i>		1		ms

Table 5. Switching ($V_{CC} = 24\text{V}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{ON}	Turn-on time	$R_L = 48\Omega$ from 80% V_{OUT} <i>Figure 5.</i>		50	100	μs
t_{OFF}	Turn-off time	$R_L = 48\Omega$ to 10% V_{OUT} <i>Figure 5.</i>		75	150	μs
$dV_{OUT}/dt_{(on)}$	Turn-on voltage slope	$R_L = 48\Omega$ from $V_{OUT} = 2.4\text{V}$ to $V_{OUT} = 19.2\text{V}$ <i>Figure 5.</i>		0.7		$\text{V}/\mu\text{s}$
$dV_{OUT}/dt_{(off)}$	Turn-off voltage slope	$R_L = 48\Omega$ from $V_{OUT} = 21.6\text{V}$ to $V_{OUT} = 2.4\text{V}$ <i>Figure 5.</i>		1.5		$\text{V}/\mu\text{s}$

Table 6. 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

Table 7. Protections

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
T_{CSD}	Case shut-down temperature		125	130	135	$^{\circ}C$
T_{CR}	Case reset temperature		110			$^{\circ}C$
T_{CHYST}	Case thermal hysteresis		7	15		$^{\circ}C$
T_{TSD}	Junction shutdown temperature		150	175	200	$^{\circ}C$
T_R	Junction reset temperature		135			$^{\circ}C$
T_{HYST}	Junction thermal hysteresis		7	15		$^{\circ}C$
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	$I_{OUT} = 0.5A; L = 6mH$	$V_{CC}-57$	$V_{CC}-52$	$V_{CC}-47$	V

Table 8. 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	$I_{STAT} = 1mA$	6.0	6.8	8.0	V
		$I_{STAT} = -1mA$		-0.7		V

Figure 3. Equivalent Internal Block Diagram (same structure for all channel)

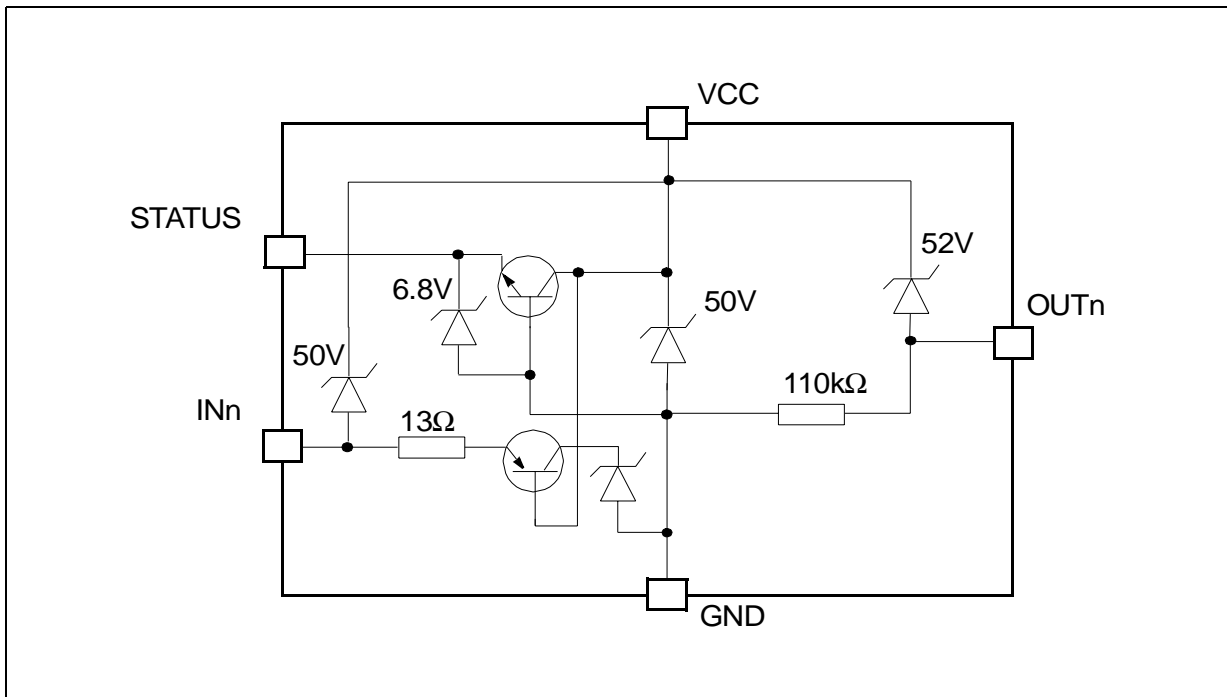
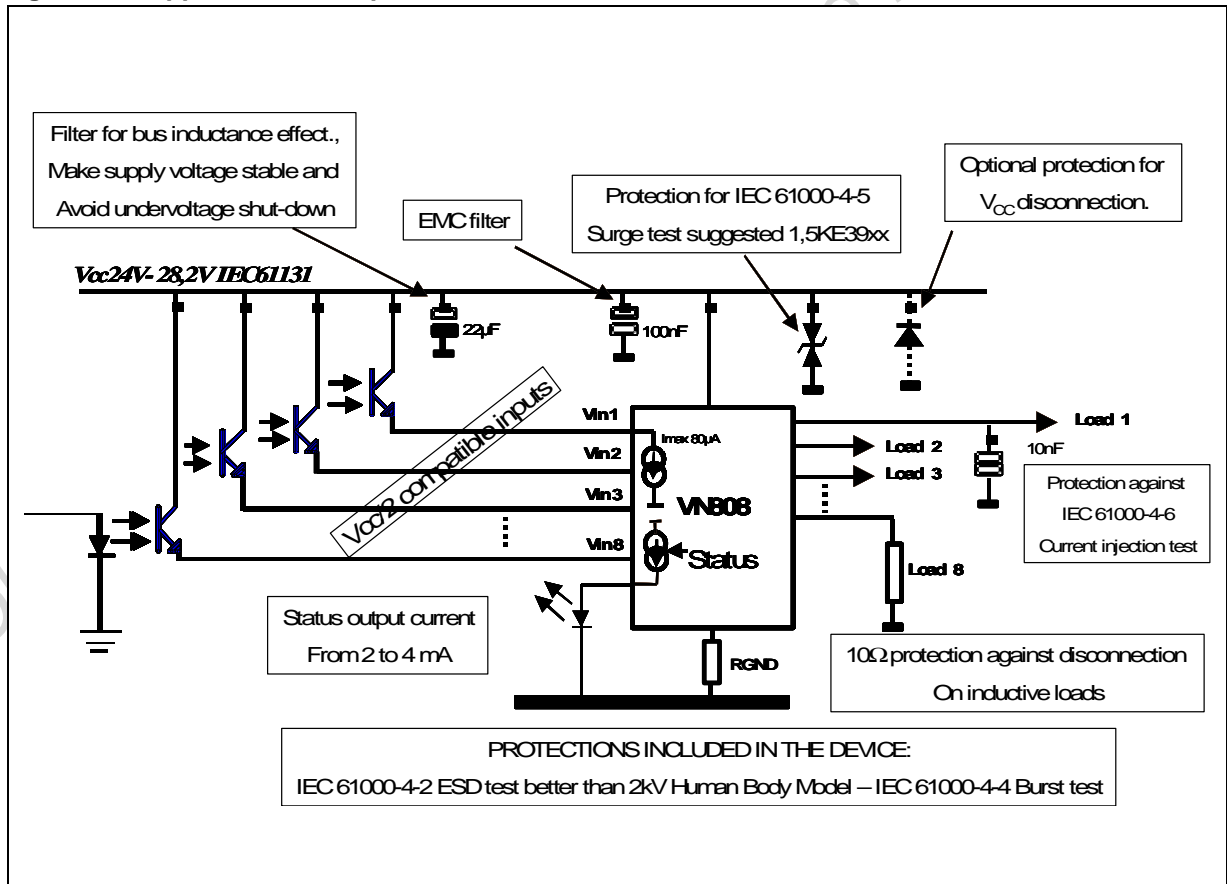


Figure 4. Application Example



Switching Time Waveforms

Figure 5. Turn-on & Turn-off

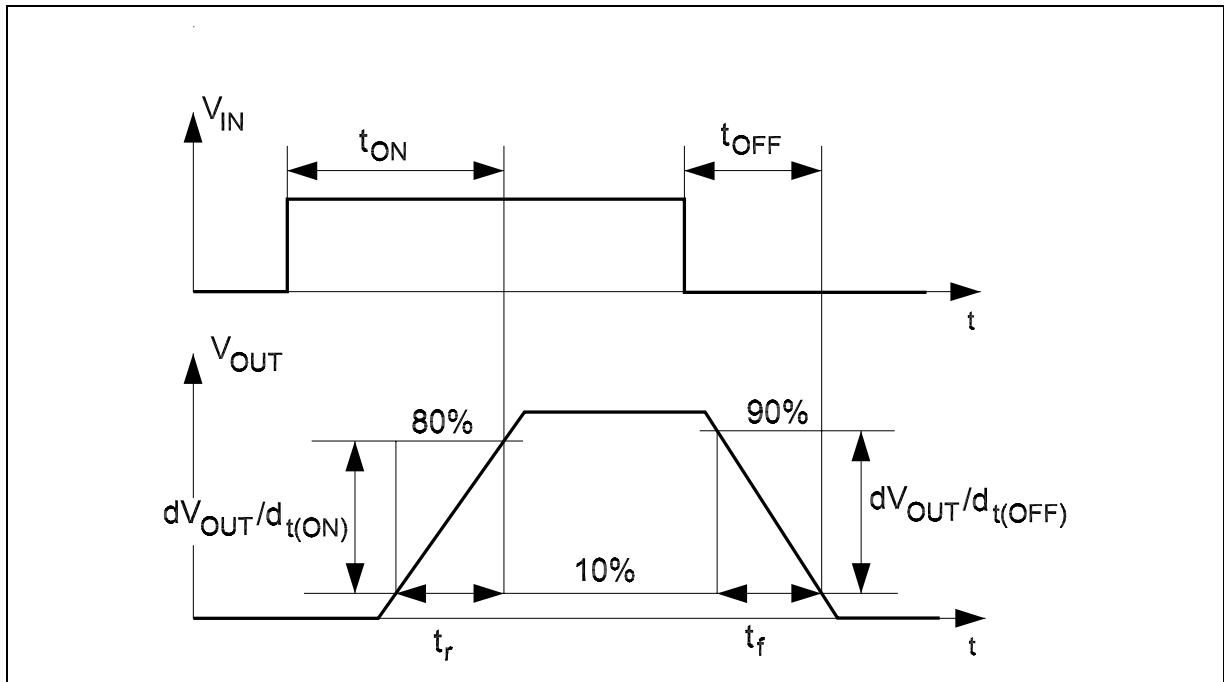


Figure 6. V_{CC} Turn-on

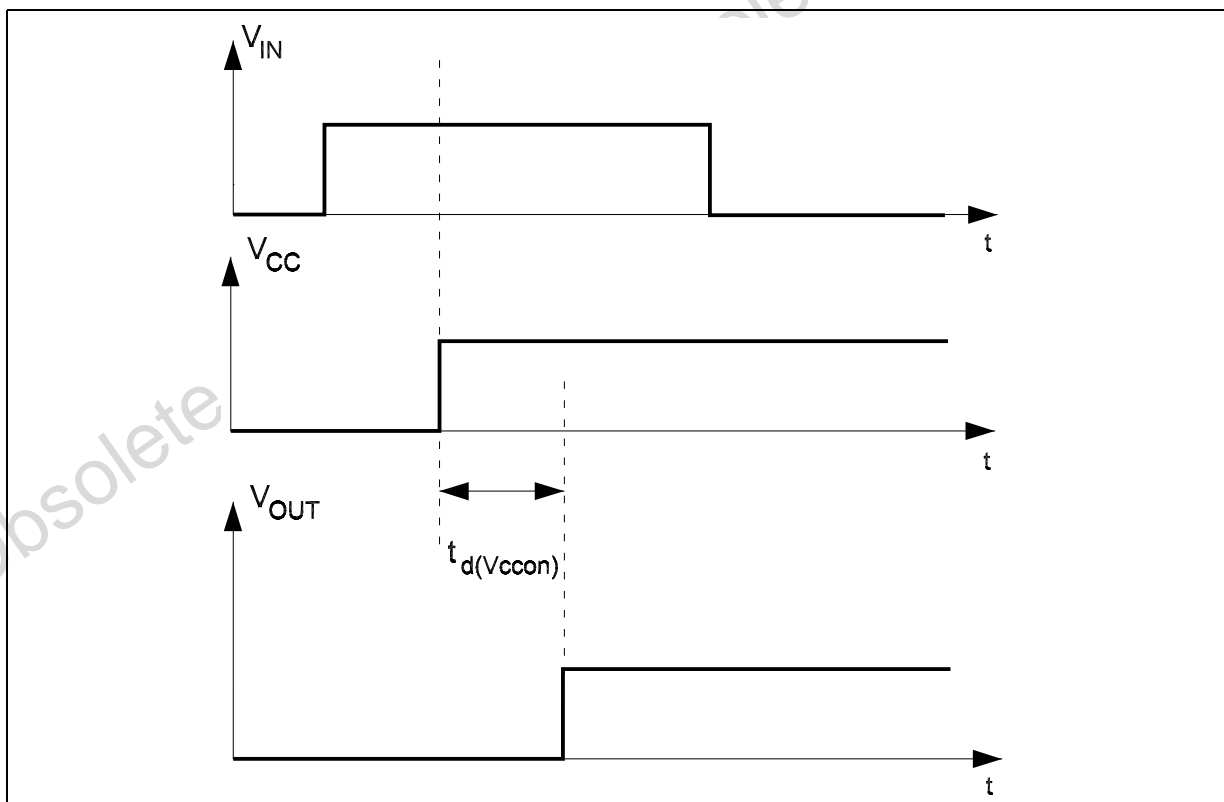


Table 9. Truth Table

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 Figure 7 . Figure 8 .) -> $T_J > T_{TSD}$	L	L	L
	H	L	H
Undervoltage	L	L	X
	H	L	X

Obsolete Product(s) - Obsolete Product(s)

Figure 7. Waveforms

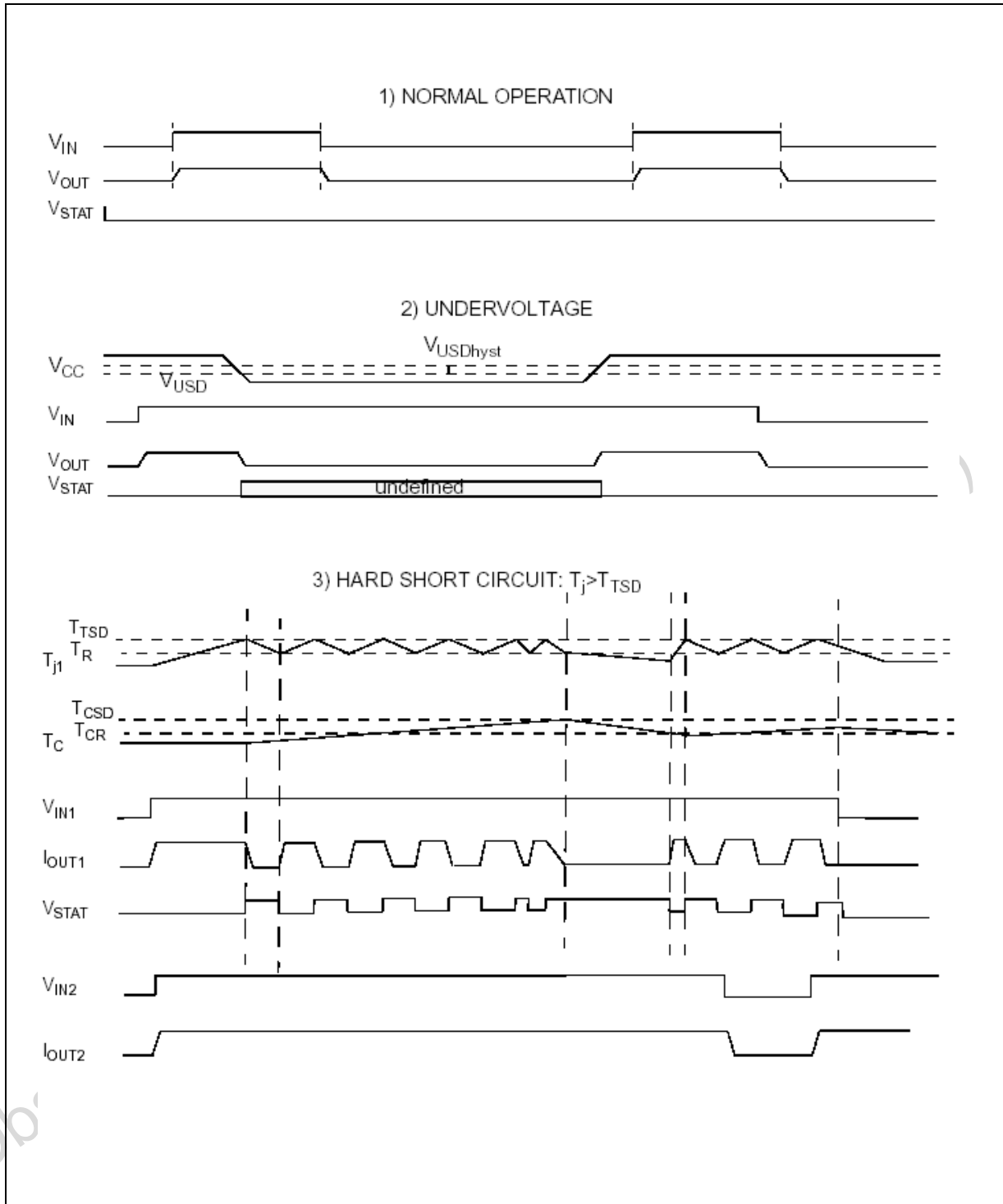
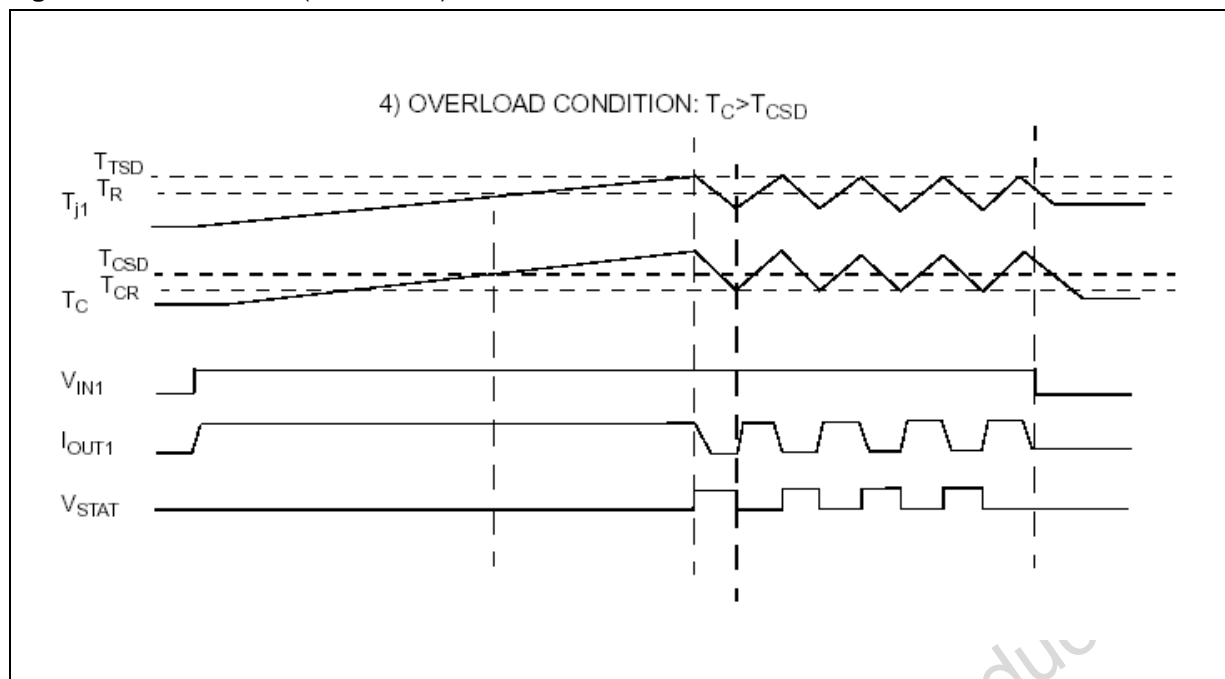


Figure 8. Waveforms (continued)



Mechanical Data

In order to meet environmental requirements, ST offers these devices in ECOPACK[®] packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

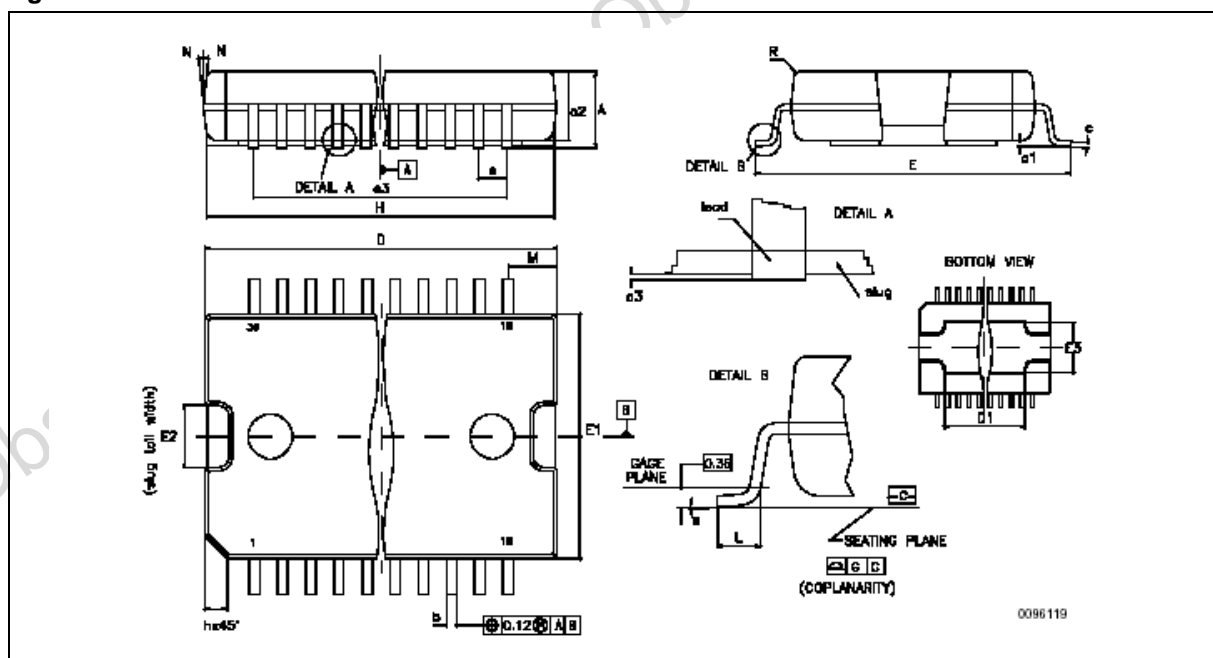
Obsolete Product(s) - Obsolete Product(s)

Table 10. 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 protusions
 - Mold flash or protusions shall non exceed 0.15mm (0.006 inch)
 - Critical dimensions are "a3", "E" and "G".

Figure 9. PowerSO-36 Scheme



VN808

Table 11. Order Codes

Package	Tube	Tape and Reel
PowerSO-36	VN808	VN80813TR

Obsolete Product(s) - Obsolete Product(s)

Table 12. Revision History

Date	Revision	Changes
13-Sep-2005	4	Final release

Obsolete Product(s) - Obsolete Product(s)

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