



40V 3.5A DOUBLE POWER HALF BRIDGE

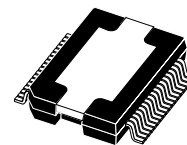
- MINIMUM INPUT OUTPUT PULSE WIDTH DISTORTION
- 200mΩ R_{dsON} COMPLEMENTARY DMOS OUTPUT STAGE
- CMOS COMPATIBLE LOGIC INPUTS
- THERMAL PROTECTION
- THERMAL WARNING OUTPUT
- UNDER VOLTAGE PROTECTION

DESCRIPTION

STA501 is a monolithic dual half bridge stage in Multipower BCD Technology.

The device is particularly designed to make the output stage of a mono All-Digital High Efficiency

MULTIPOWER BCD TECHNOLOGY

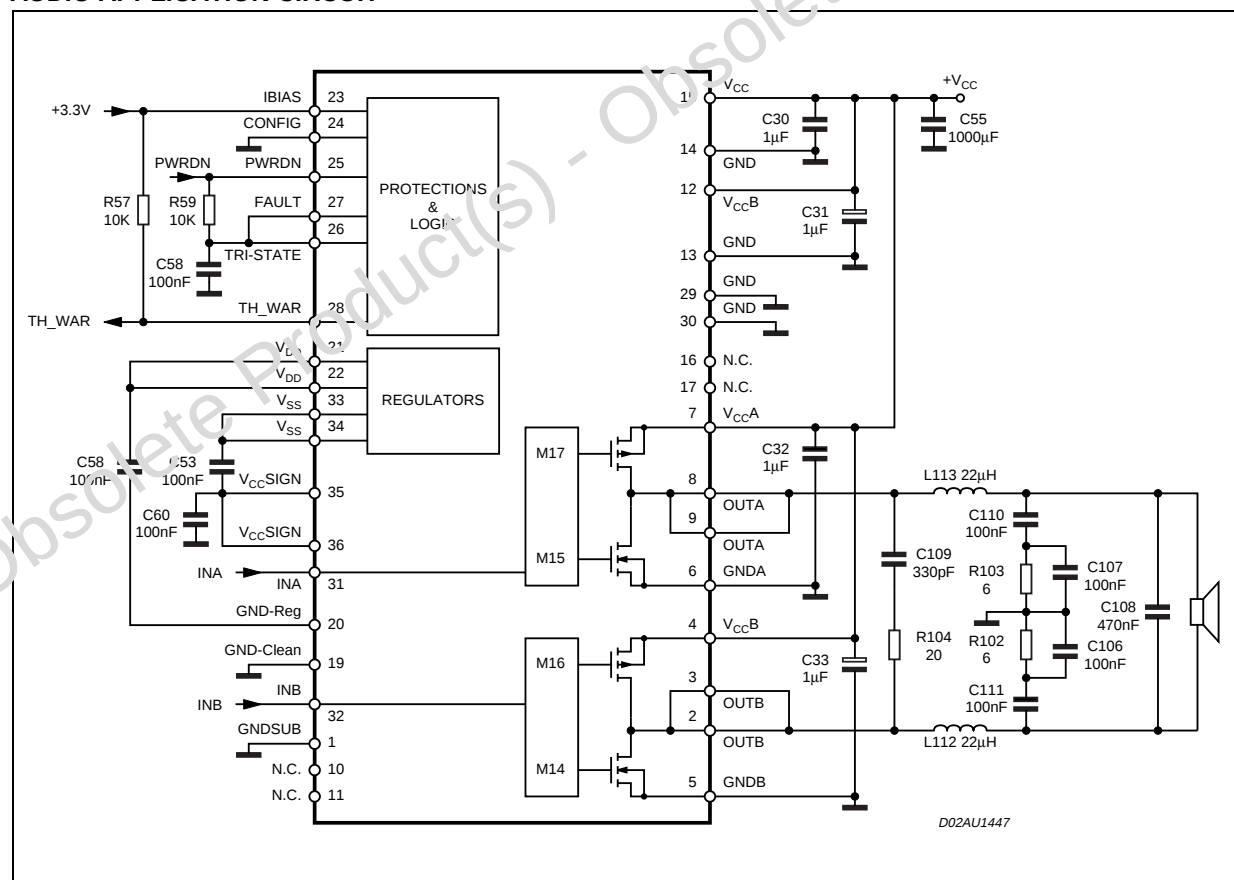


PowerSO36

ORDERING NUMBER: STA501

(DDX™) amplifier capable to deliver 50W @ THD = 10% at V_{CC} 30V output power on 8Ω load. The input pins have threshold proportional to I_{bias} pin voltage.

AUDIO APPLICATION CIRCUIT



PIN FUNCTION

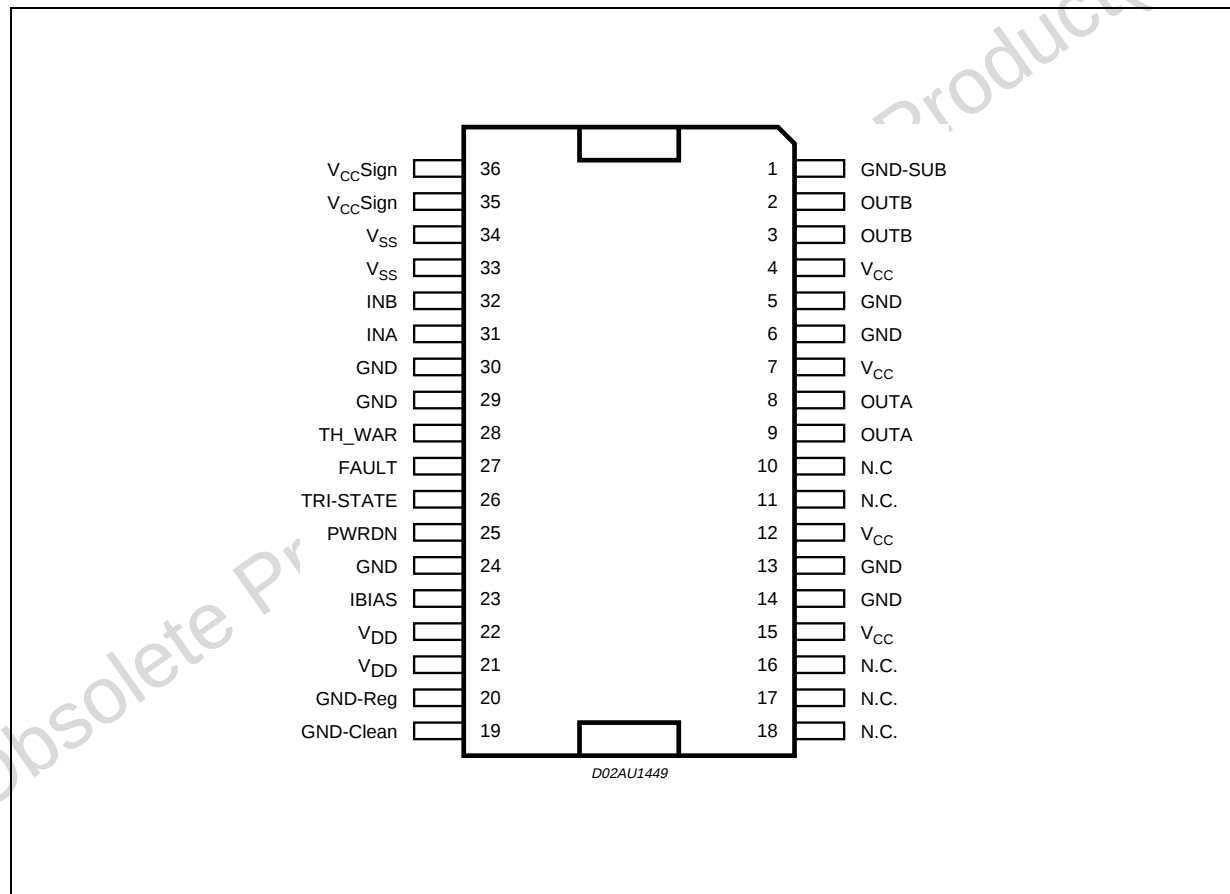
N°	Pin	Description
1	GND-SUB	Substrate ground
35 ; 36	Vcc Sign	Signal Positive Supply
15	Vcc	Positive Supply
12	Vcc	Positive Supply
7	Vcc	Positive Supply
4	Vcc	Positive Supply
14	GND	Negative Supply
13	GND	Negative Supply
6	GND	Negative Supply
5	GND	Negative Supply
16 ; 17	N.C.	
10 ; 11	N.C.	
8 ; 9	OUTA	Output half bridge
2 ; 3	OUTB	Output half bridge
29	GND	
30	GND	
31	INA	Input of half bridge
32	INB	Input of half bridge
21 ; 22	Vdd	5V Regulator referred to ground
33 ; 34	Vss	5V Regulator referred to +Vcc
25	PWRDN	Stand-by pin
26	TRI-STATE	Hi-Z pin
27	FAULT	Fault pin advisor
24	GND	
28	TH-WAR	Thermal warning advisor
19	GND-clean	Logical ground
23	IBIAS	High logical state setting voltage
18	NC	Not connected
20	GND-Reg	Ground for regulator Vdd

FUNCTIONAL PIN STATUS

PIN NAME	Logical value	IC -STATUS
FAULT	0	Fault detected (Short circuit, or Thermal ..)
FAULT *	1	Normal Operation
TRI-STATE	0	All powers in Hi-Z state
TRI-STATE	1	Normal operation
PWRDN	0	Low absorption
PWRDN	1	Normal operation
THWAR	0	Temperature of the IC =130C
THWAR*	1	Normal operation

* : The pin is open collector. To have the high logic value, it needs to be pulled up by a resistor.

PIN CONNECTION



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CE}	DC Supply Voltage (Pin 4, 7, 12, 15)	40	V
V_{max}	Maximum Voltage on pins 23 to 32	5.5	V
T_{op}	Operating Temperature Range	0 to 70	°C
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	°C

THERMAL DATA

Symbol	Parameter	Min.	Typ.	Max.	Unit
T_{j-case}	Thermal Resistance Junction to Case (thermal pad)			2.5	°C/W
T_{jSD}	Thermal shut-down junction temperature		150		°C
T_{warn}	Thermal warning temperature		130		°C
t_{hSD}	Thermal shut-down hysteresis		25		°C

ELECTRICAL CHARACTERISTICS ($I_{bias} = 3.3V$; $V_{CC} = 30V$; $T_{amb} = 25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
R_{dsON}	Power Pchannel/Nchannel MOSFET R_{dsON}	$I_d=1A$		200	270	mΩ
I_{dss}	Power Pchannel/Nchannel leakage I_{dss}	$V_{CC}=35V$			50	μA
g_N	Power Pchannel R_{dsON} Matching	$I_d=1A$	95			%
g_P	Power Nchannel R_{dsON} Matching	$I_d=1A$	95			%
Dt_s	Low current Dead Time (static)	see test circuit no.1; see fig. 1		10	20	ns
Dt_d	High current Dead Time (dynamic)	$L=22\mu H$; $C = 470nF$; $R_l = 8\ \Omega$ $I_d=3.5A$; see fig. 3			50	ns
t_{dON}	Turn-on delay time	Resistive load			100	ns
t_{dOFF}	Turn-off delay time	Resistive load			100	ns
t_r	Rise time	Resistive load			25	ns
t_f	Fall time	Resistive load; as fig. 1			25	ns
V_{CC}	Supply voltage operating voltage		10		36	V
V_{IN-H}	High level input voltage				$I_{bias}/2 + 300mV$	V
V_{IN-L}	Low level input voltage		$I_{bias}/2 - 300mV$			V
I_{IN-H}	Hi level Input current	Pin voltage = I_{bias}		1		μA

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{IN-L}	Low level input current	Pin voltage = 0.3V		1		μA
$I_{PWRDN-H}$	Hi level PWRDN pin input current	$I_{bias} = 3.3V$		35		μA
V_L	Low logical state voltage V_L (pin PWRDN, TRISTATE) (note 1)	$I_{bias} = 3.3V$	0.8			V
V_H	High logical state voltage V_H (pin PWRDN, TRISTATE) (note 1)	$I_{bias} = 3.3V$			1.7	V
$I_{VCC-PWRDN}$	Supply Current from Vcc in Power Down	PWRDN = 0			3	mA
I_{FAULT}	Output Current pins FAULT -TH-WARN when FAULT CONDITIONS	$V_{pin} = 3.3V$		1		mA
$I_{VCC-hiz}$	Supply current from Vcc in Tri-state	$V_{cc}=30V$; Tri-state=0		22		mA
I_{VCC}	Supply current from Vcc in operation (both channel switching)	Input pulse width = 50% Duty; Switching Frequency = 384Khz; No LC filters;		50		mA
I_{out-sh}	Overcurrent protection threshold (short circuit current limit)		3.5	6	8	A
V_{UV}	Undervoltage protection threshold			7		V
t_{pw-min}	Output minimum pulse width	No Load	70		150	ns

Notes: 1. The following table explains the V_L , V_H variation with I_{bias}

I_{bias}	V_{Lmin}	V_{Hmax}	Unit
2.7	0.7	1.5	V
3.3	0.8	1.7	V
5	0.85	1.85	V

LOGIC TRUTH TABLE (see fig. 2)

TRI-STATE	INA	INB	Q1	Q2	Q3	Q4	OUTPUT MODE
0	x	x	OFF	OFF	OFF	OFF	Hi-Z
1	0	0	OFF	OFF	ON	ON	DUMP
1	0	1	OFF	ON	ON	OFF	NEGATIVE
1	1	0	ON	OFF	OFF	ON	POSITIVE
1	1	1	ON	ON	OFF	OFF	Not used

Figure 1. Test Circuit.

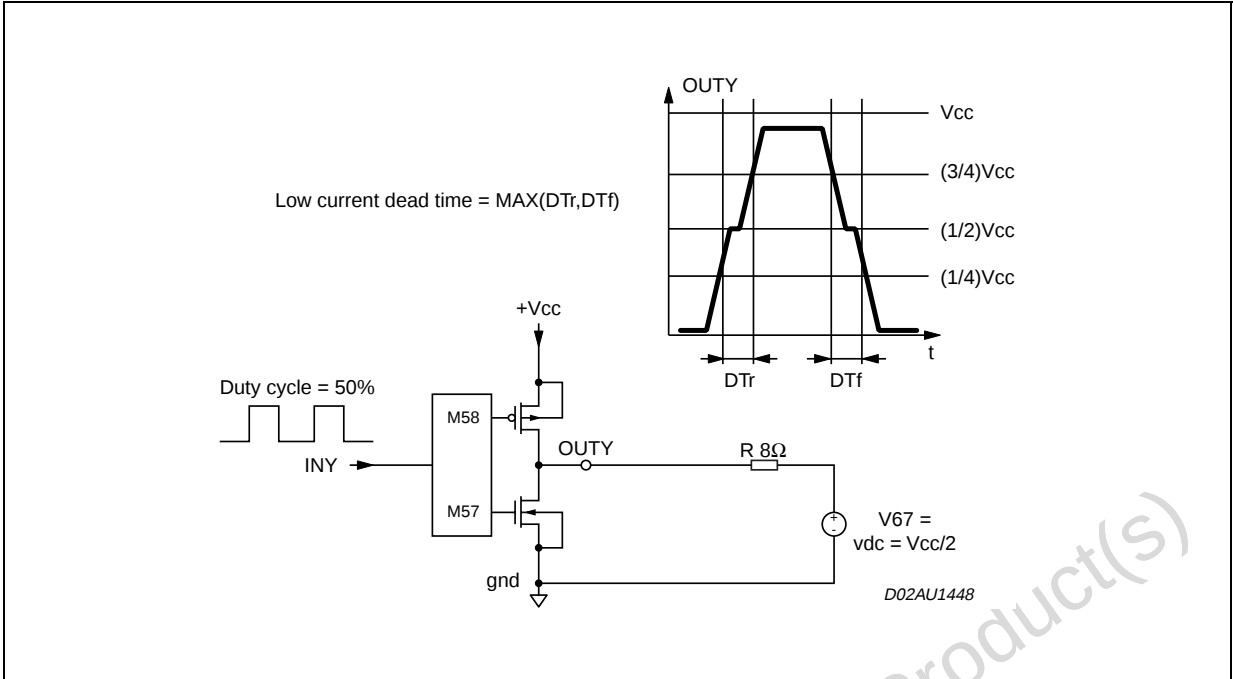


Figure 2.

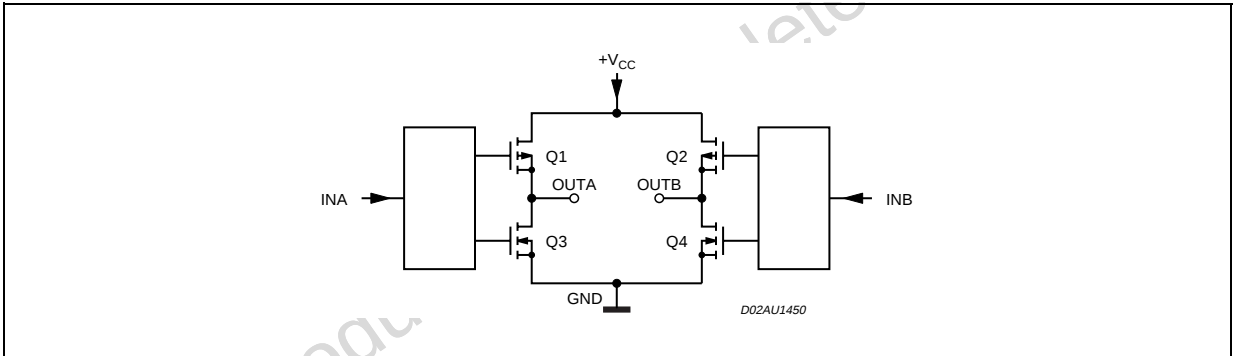
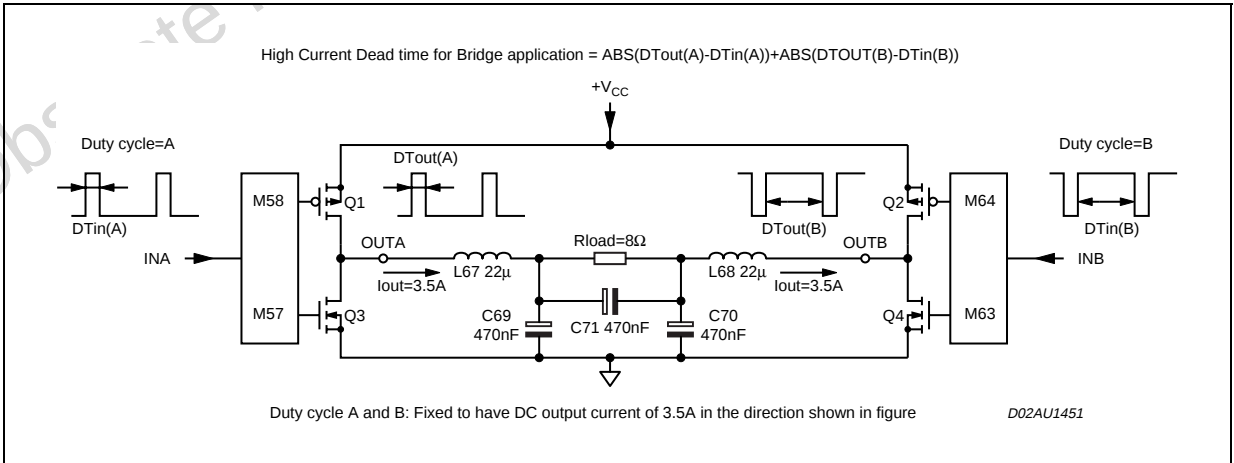


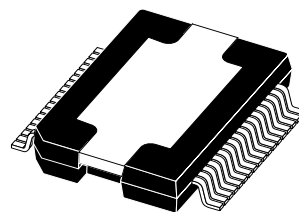
Figure 3.



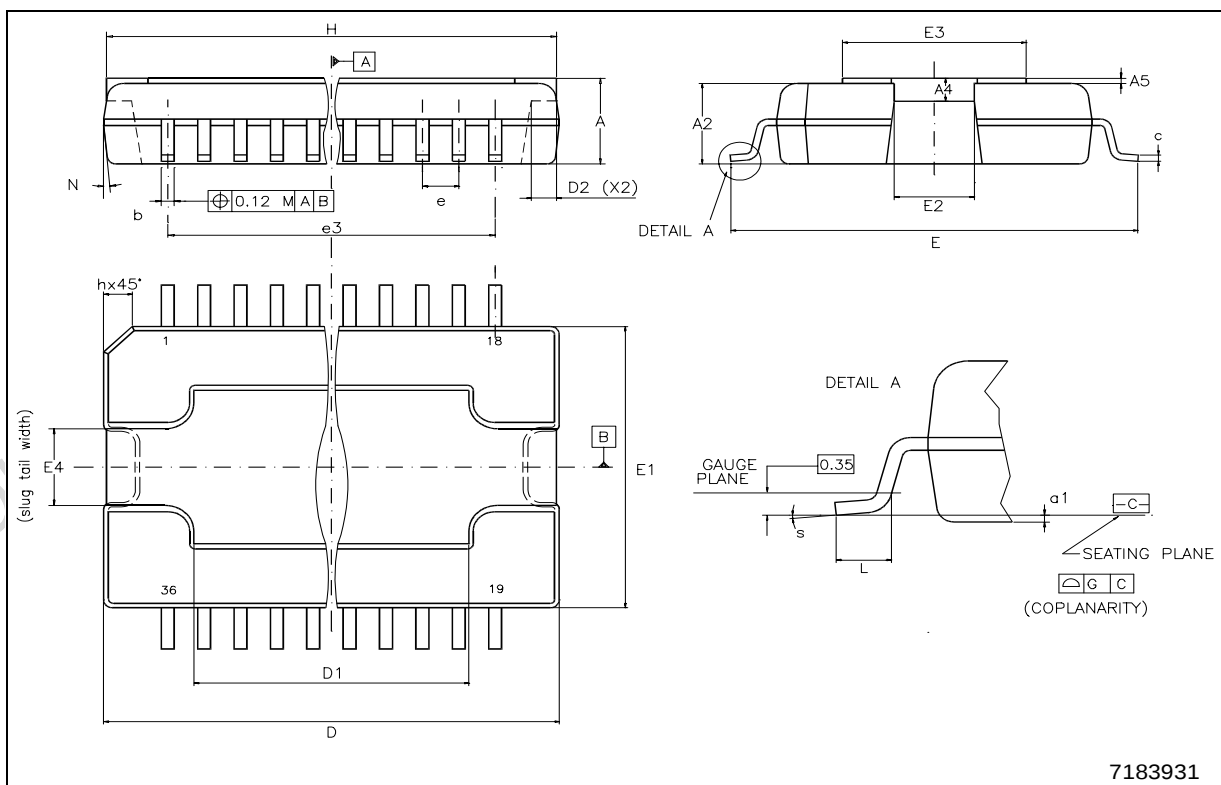
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.25		3.5	0.128		0.138
A2			3.3			0.13
A4	0.8		1	0.031		0.039
A5		0.2			0.008	
a1	0		0.075	0		0.003
b	0.22		0.38	0.008		0.015
c	0.23		0.32	0.009		0.012
D	15.8		16	0.622		0.630
D1	9.4		9.8	0.37		0.38
D2		1			0.039	
E	13.9		14.5	0.547		0.57
E1	10.9		11.1	0.429		0.437
E2			2.9			0.114
E3	5.8		6.2	0.228		0.244
E4	2.9		3.2	0.114		1.259
e		0.65			0.026	
e3		11.05			0.435	
G	0		0.075	0		0.003
H	15.5		15.9	0.61		0.625
h			1.1			0.043
L	0.8		1.1	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 not exceed 0.15mm (0.006")
- (2) No intrusion allowed inwards the leads.

OUTLINE AND MECHANICAL DATA



PowerSO36 (SLUG UP)



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